

California Environmental Protection Agency
Air Resources Board



**INITIAL STATEMENT OF REASONS FOR PROPOSED AMENDMENTS TO THE
CALIFORNIA CONSUMER PRODUCTS REGULATION**

**Release Date:
May 9, 2008**

**State of California
AIR RESOURCES BOARD**

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To be considered by the Air Resources Board at a
Public Hearing on June 26, 2008, at:

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Air Resources Board, Cal/EPA Headquarters
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**State of California
AIR RESOURCES BOARD**

**PROPOSED AMENDMENTS TO THE
CALIFORNIA CONSUMER PRODUCTS REGULATION**

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May 9, 2008

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**State of California
AIR RESOURCES BOARD**

**Initial Statement of Reasons for Proposed Amendments to the
California Consumer Products Regulation**

Executive Summary

EXECUTIVE SUMMARY

In this rulemaking, California Air Resources Board (ARB or Board) staff is proposing amendments to the Consumer Products Regulation that are designed to reduce volatile organic compound (VOC) and air toxic emissions. The proposed amendments would also reduce the global warming potential (GWP) of greenhouse gas (GHG) compounds used in a specific product category. The regulation is codified in title 17, California Code of Regulations, sections 94507-94517. The proposed amendments to reduce VOC emissions would partially fulfill the consumer products reduction commitment contained in the State Strategy for California's 2007 State Implementation Plan (Strategy) to meet the federal ozone standard. The proposed amendment to reduce the use of compounds with high GWP is designed in accordance with the Discrete Early Action Measure requirements as set forth in the California Global Warming Solutions Act of 2006 (AB 32).

The proposed amendments would set new VOC limits for multiple product categories. When fully implemented, about 5.8 tons per day VOC emission reduction would be achieved. The proposed amendments would also set the first GWP limit for consumer products. Reductions in the use of compounds with high GWP is equivalent to reducing carbon dioxide emissions by 0.20 million metric tons (MMT CO₂e) per year. Air toxics emissions would be reduced by about 0.2 tons per day by prohibiting the use of certain chlorinated toxic air contaminants (TAC) in seven categories.

As proposed, other amendments would exempt a compound from the definition of VOC, and language modifications would clarify and improve existing regulatory provisions.

In developing the proposal, staff evaluated the economic and environmental impacts. Staff found that the proposed amendments should result in an overall environmental benefit in that exposure to ground-level ozone and TACs would be reduced. Reducing the use of compounds with high GWP would have a beneficial impact on climate change. No significant adverse environmental or economic impacts were identified.

This Executive Summary, together with Appendix A, the Technical Support Document, is the Initial Statement of Reasons for Proposed Rulemaking required by the California Administrative Procedures Act. Appendix B contains the regulation with the proposed changes shown in underline and ~~strikeout~~ form.

Among other things, this Executive Summary, provides a description of the staff's proposed amendments to the Consumer Products Regulation, and explains the rationale for the proposed changes. In accordance with Government Code section 11346.2(a)(1), Chapter V of the Technical Support Document (Appendix A) provides a "plain English" summary of the proposal in more detail.

A. AUTHORITY TO REGULATE CONSUMER PRODUCTS

Consumer products are chemically formulated products used by household and institutional consumers. Examples include detergents; cleaning products; floor finishes; personal care products; lawn and garden products; disinfectants; automotive specialty products; and aerosol paints.

The Health and Safety Code sets forth ARB's authority to regulate consumer products to control VOCs and GHGs. Section 41712 specifies requirements to reduce VOC emissions as a ground-level ozone control strategy. Section 38500 *et seq.*, establishes authority to reduce the impacts of GHGs used in consumer products to slow climate change.

1. Health and Safety Code section 41712

In 1988, the California Clean Air Act (CCAA or "the Act") added section 41712 to the California Health and Safety Code. Section 41712, along with subsequent amendments, requires ARB to adopt regulations to achieve the maximum feasible reduction in VOC emissions from consumer products. The CCAA specified that attainment of the California State ambient air quality standard is necessary to promote and protect public health, particularly of children, older people, and those with respiratory diseases. The Legislature also directed that these standards be attained by the earliest practicable date.

Prior to adoption, the Board must determine that adequate data exist to establish that the regulations are necessary to attain State and federal ambient air quality standards; and the regulations are commercially and technologically feasible. The Act further stipulates that regulations adopted must not eliminate any product form, and that recommendations from health professionals be considered when developing VOC control measures for health benefit products. The intent of section 41712 is primarily to reduce ground-level ozone concentrations.

2. Health and Safety Code section 38500 *et seq.*

In 2006, AB 32, The California Global Warming Solutions Act of 2006, was signed into law. This law created a comprehensive, multi-year program to reduce GHG emissions in California. Health and Safety Code, commencing with section 38500, contains the provisions. AB 32 requires ARB to develop regulations and consider market-based compliance mechanisms that will ultimately restore California's GHG emissions to the 1990 baseline year by 2020. Beyond the requirements of AB 32, the Governor's Executive Order EO-S-03-05 calls for an additional GHG reduction of 80 percent by 2050.

AB 32, among other things, requires immediate progress, described as Discrete Early Action Measures, to reduce GHGs. Discrete Early Action Measures are defined as regulations adopted to reduce GHG emissions that become enforceable by

January 1, 2010. Reduction of compounds with high GWP that are used in consumer products has been designated as a Discrete Early Action Measure.

B. EXISTING REGULATIONS

Over the last twenty years, the Board has taken numerous actions to fulfill the legislative mandate pertaining to the regulation of consumer products. Three regulations have been adopted that affect 115 consumer product categories by setting 150 VOC limits. These limits, when fully effective, will have resulted in reducing emissions by about 200 tons per day, an overall 44 percent reduction in VOC emissions. We have also reduced exposure to TACs. Emissions of TACs have been reduced by 13 tons per day by prohibiting use of chlorinated compounds in 63 categories. In addition, two voluntary regulations, the Alternative Control Plan and the Hairspray Credit Program have been adopted to provide compliance flexibility to companies. These five regulations are codified in title 17, California Code of Regulations, sections 94500 to 94575.

C. REGULATORY DEVELOPMENT PROCESS

In order to involve the public, the Consumer Products Regulation Workgroup (CPRWG), was established in 2004. Participation in the CPRWG was open to any member of the public. The CPRWG participated in the development of the 2003 Consumer and Commercial Products Survey (2003 Survey), which serves as the basis for this proposal. The CPRWG was instrumental in the development of the 2004 and 2006 amendments, as well as these proposed amendments. Consumer product manufacturers, chemical producers, marketers, trade associations, environmental groups, air districts, and various other stakeholders, have all actively participated.

Further outreach, beyond the CPRWG, was conducted to identify and involve stakeholders in the development of the Discrete Early Action Measure for GHG reductions. For example, in February 2008, ARB conducted a survey for the Pressurized Gas Duster category to update sales and formulation data for the 2007 calendar year (ARB, 2008c).

The categories proposed for regulation in this rulemaking were deferred from consideration as part of the 2006 rulemaking. During that rulemaking, numerous issues were raised that required additional evaluation and analysis in these categories. In addition to the outreach for the 2006 rulemaking, where proposals for these categories were initially discussed, a public CPRWG meeting and a public workshop were conducted on August 29, 2007 and March 5, 2008, respectively. Prior to meetings, staff posted materials for review and comment to the CPRWG activity website.

D. EMISSIONS

Although each consumer product may seem to be a small source of emissions, the cumulative use of these products by over 37 million Californians results in significant emissions (CA DOF, 2007).

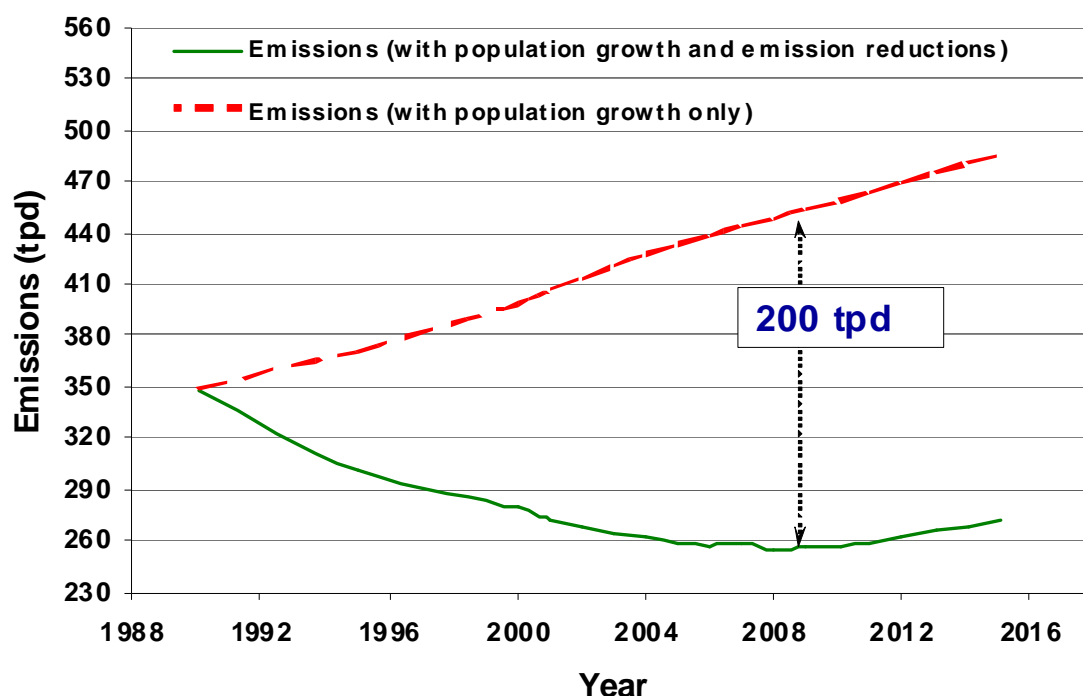
1. VOC Emissions

Consumer products are a significant source of VOC emissions in California and contribute to the formation of both ground-level ozone and particulate matter pollution. This section, however, focuses on reducing emissions from consumer products as a ground-level ozone control strategy. As evidence of the magnitude of consumer product VOC emissions, it is estimated that in 2010 consumer products emissions will be approximately 243 tons per day, or about 12 percent of the overall VOC inventory. In this same year, consumer product emissions will comprise about 18 and 7 percent of VOC emissions in the South Coast Air Quality Management District (SCAQMD) and San Joaquin Valley Air Pollution Control District (SJVAPCD), respectively. Without further actions, consumer product emissions are expected to grow to approximately 270 tons per day in 2020, representing 14 percent of statewide VOC emissions (ARB, 2007h).

As control measures for other VOC sources (*i.e.* on-road motor vehicles) become effective, consumer product emissions become more important in the SCAQMD. In fact, it is estimated that emissions from consumer products will be the number one source of VOC emissions in the SCAQMD in 2020. While the ozone forming potential of consumer product emissions is less than some other source categories (for *e.g.*, mobile sources), clearly, further reductions in VOC emissions from consumer products and other VOC sources are needed, if ozone attainment is to be achieved.

Despite these projections, ARB's consumer products program is a success story. Since 1989, regulations adopted by the ARB, and subsequent amendments, have significantly reduced VOC emissions from consumer products. Absent these regulations today, consumer product emissions would likely be over 440 tons per day. Figure ES-1 shows that statewide consumer product VOC emissions will have been reduced by over 200 tons per day in 2010. However, Figure ES-1 also shows that without further actions population growth would likely reverse the trend.

**Figure ES-1
Consumer Products VOC Emission Trends**



The emission values in Figure ES-1 are derived from several data sources. Emissions for 1990 to 2006 are taken from the ARB Forecasted Emissions by Summary Category, 2007 Almanac (ARB, 2007h). Emissions are then grown in proportion to population increase. Population growth is in accordance with estimates in the California Environmental Protection Agency's (Cal/EPA) Statewide Human Population Table found in the Population and Vehicle Trends Report (ARB, 2008d). For categories regulated in the 2006 Consumer Products Amendments, emission values from the 2003 Survey and the projected emissions reductions resulting from the VOC limits approved in 2006, are reflected in the Figure.

2. Greenhouse Gas Emissions

Greenhouse gas emissions from consumer products are small relative to other sources, such as vehicle exhaust. However, the magnitude of the climate change problem justifies reductions from both large and small sources, wherever such measures are feasible and cost-effective. While staff is still in the process of developing the consumer product GHG inventory, we do know from past surveys that several compounds with high GWP are used in consumer products.

Consumer products use various GHGs, mostly as propellants. To a much lesser degree, several solvents with fairly high GWPs are used. The propellants are typically low photochemically reactive compounds that are exempt VOCs. They have been used as a reformulation strategy to reduce VOC content. Compounds of interest include

hydrofluorocarbons (HFCs), hydrochlorofluorocarbons (HCFCs), hydrofluoroethers (HFEs), carbon dioxide (CO₂), and nitrous oxide (N₂O). However, the propellants HFC-134a and HFC-152a are the predominate GHGs used in consumer products today. Compressed CO₂ is also used as a propellant, but the GHG emissions are negligible compared to the emissions from HFCs. Table ES-1 shows some examples of GHGs that are used in consumer products.

Table ES-1
Global Warming Potential of Selected Compounds Used in Consumer Products

Compound	SAR GWP*	FAR GWP**
CO ₂	1	1
HFE-7200	N/A	59
HFC-152a	140	124
HCFC-141b	N/A	725
HFC-134a	1300	1430
HFC-43 10mee	1300	1640

* 100 year timeframe, IPCC Second Assessment Report value

** 100 year timeframe, IPCC Fourth Assessment Report value

Using the values in Table ES-1, we see that the GWP for HFC-134a is approximately ten times greater than the GWP of HFC-152a and 1300 times greater than CO₂. Reductions in the use of HFC-134a are being pursued in this rulemaking.

GHG emissions data are available from a 2003 Survey of consumer products. Staff has evaluated these data for possible GHG reductions and development of new regulations for this rulemaking. In the 2006 Survey, we collected information from manufacturers of consumer products to determine the usage of compounds with high GWP in additional categories of consumer products. Staff will use the 2006 Survey data to develop the GHG inventory for consumer products, and evaluate the data for product categories where compounds with high GWP are used to determine if there is a potential to reduce their use without increasing the use of VOCs.

E. EMISSION REDUCTION MANDATES

Reduction of VOCs and GHGs are necessary to attain California's ambient air quality standards and climate change reduction goals, respectively. The role of consumer products to meet these mandates is described in this section.

1. Consumer Products and California's State Implementation Plan

In 1988, with the passing of the CCAA, the importance of controlling emissions from consumer products was set forth. To meet the federal standards, in 1994 emission reductions from consumer products became part of the California State Implementation Plan (SIP) for ozone. In this SIP, consumer products measures were put in place to work towards attaining the federal peak one-hour ambient air quality standard for ozone. In 2003 SIP, ARB again reiterated the commitment to reduce consumer products VOC emissions to meet the one-hour federal ozone standard.

In response to these mandates, three regulations with 150 VOC limits for 115 categories of consumer products (including antiperspirants and deodorants and 36 aerosol coatings categories) have been established to date. The adopted limits will achieve a 44 percent reduction in overall VOC emissions from consumer products by the year 2010.

The 2003 SIP was withdrawn, however, the remaining consumer product emission reduction commitment was incorporated into the Strategy, which includes California's plan to attain the national ozone standard of 0.08 parts per million (ppm) averaged over eight-hours. In the Strategy, ARB has committed to an additional 30 to 40 tons per day VOC reduction from consumer products by 2014. Under the commitment, rulemakings are to occur in the 2007 to 2008 timeframe with reductions occurring between 2010 to 2012. Further rulemakings between 2010 and 2012, with implementation dates in the 2012 to 2014 timeframe, are to complete the emission reduction commitment.

The Strategy also acknowledges that VOC reductions from consumer products are becoming more difficult to achieve. In light of this, the Strategy includes a commitment to explore innovative reduction strategies in the longer term. These measures would include investigating emission reduction opportunities through reactivity-based standards and alternative market-based mechanisms. If these mechanisms cannot produce meaningful emission reductions from the consumer products source category, then other approaches would be evaluated. Some of these approaches include the purchase of VOC credits; and funding of special projects to reduce emissions or accelerate reductions from pollution sources outside of the consumer products industry.

The amendments proposed in this rulemaking are intended to partially fulfill the Strategy commitment for VOC reductions from consumer products.

2. Discrete Early Action Measures and Scoping Plan

Among other things, AB 32 requires ARB to design and adopt an overall Scoping Plan, by January 1, 2009, that identifies how GHG emissions can be reduced back to 1990 levels. AB 32 additionally recognizes that immediate progress in reducing GHG emissions can and should be made. Accordingly, AB 32 required ARB to identify a list of "Discrete Early Action GHG Reduction Measures" by June 30, 2007. Discrete Early Actions are Board adopted regulations to reduce GHG emissions that become legally effective by January 1, 2010. These measures are to become part of the State's comprehensive strategy for achieving GHG reductions. Beyond the requirements of AB 32, the Governor's Executive Order EO-S-03-05 calls for an additional GHG reduction of 80 percent by 2050.

In June 2007, ARB approved a list of early action GHG reduction measures. Additions to the list were approved by the Board at its October 2007 hearing. A subset

of these early action measures was identified as “Discrete Early Action Measures.” One of the approved Discrete Early Action Measures designated in the Early Action Report calls for the reduction in use of high GWP GHGs in consumer products. The measure was estimated to achieve an emissions reduction of 0.25 MMT CO₂e per year from consumer products (ARB, 2007b).

The objective of the Consumer Products Discrete Early Action Measure is to reduce the use of compounds with high GWP when alternatives are available. To achieve reductions of GHG emissions, consumer product formulations would need to be changed to reduce or eliminate the use of compounds with high GWPs. The reduction in use of compounds with high GWP in consumer products is a long-term effort. We are continuing to develop an emission inventory that will be used to evaluate reduction opportunities.

We are proposing a GWP limit for Pressurized Gas Duster products. If adopted by ARB, this will be the first GWP limit in place for consumer products. In future rulemakings, staff anticipates developing proposals for reductions of GHGs from other consumer product categories.

F. ESTIMATED EMISSIONS FROM CATEGORIES PROPOSED TO BE REGULATED

The 2003 Survey serves as the basis for the proposed amendments to reduce VOC emissions. The 2003 Survey provided staff with detailed information on the formulations of consumer products, including complete speciation of VOCs, low vapor pressure VOC (LVP-VOC) solvents, and key exempt ingredients. Total volumes of inorganic and other compounds were also provided. Information on sales, product form, customer types, and company size and economics were also included. For this rulemaking, the 2008 emissions and reduction estimates for 2010, 2012, 2013, 2014, and 2015 were grown from 2003 sales data and the state Department of Finance’s population estimates. Annual population growth factors were calculated using the 2008 State population figures and the California Environmental Protection Agency’s (Cal/EPA) Statewide Human Population Table found in the Population and Vehicle Trends Report (ARB, 2008d). We estimate that the categories proposed for VOC regulation contribute about 22.6 tons per day of 2008 VOC emissions.

The GHG emissions from Pressurized Gas Dusters are estimated to be 0.37 MMT CO₂e per year. This estimate is based on the results of the Pressurized Gas Duster Survey update collected in February, 2008 (ARB, 2008a).

G. SUMMARY OF PROPOSED AMENDMENTS

First of all, to reflect that the “Regulation to Reduce Volatile Organic Compounds from Consumer Products” now contains requirements for both VOC and GHG reductions, we are proposing to rename the regulation. As proposed, the regulation would be re-titled “Regulation to Reduce Emissions from Consumer Products.”

Amendments are being proposed to six sections in the Consumer Products Regulation: section 94508 “Definitions,” section 94509 “Standards for Consumer Products,” section 94510 “Exemptions,” section 94512 “Administrative Requirements,” section 94513 “Reporting Requirements,” and section 94515 “Test Methods.” In addition to the amendments described below, a number of non-substantive grammatical and organizational changes are also proposed. Chapter V of the Technical Support Document contains more complete information on each proposal.

1. Definitions (Section 94508)

Section 94508, “Definitions,” provides all the terms used in the Consumer Products Regulation which are not self-explanatory. As shown in Table ES-2, the proposed amendments to the Consumer Products Regulation include new or revised definitions. These definitions are necessary to define categories proposed for VOC limits or greenhouse gas limits, or to improve enforceability of the Consumer Products Regulation. Note that a number of categories have been previously regulated and we are now proposing lower VOC limits. Several definitions require further clarification.

Global Warming Potential and Global Warming Potential Value: We are proposing new definitions for Global Warming Potential (GWP) and Global Warming Potential Value (GWP Value). These definitions are necessary to implement our proposal to reduce the use of compounds with high GWPs in Pressurized Gas Dusters. We are using the GWP definition of the Intergovernmental Panel on Climate Change (IPCC). GWP provides a measure of a compound’s impact on global warming compared to CO₂. The GWP Value definition specifies that the IPCC Second Assessment Report (SAR) would be used to determine GWP values (IPCC, 1996). To enforce the proposal for reducing the use of compounds with high GWP, the definition would further specify that, if the SAR does not contain a GWP value for a specific chemical or compound, then the IPCC Fourth Assessment Report (FAR) GWP value for that chemical or compound will be used. If there is no GWP value listed for a chemical or compound in the SAR or the FAR, then the GWP value will be assumed to be equal to the applicable GWP limit (*i.e.* the GWP limit established for specific consumer product categories), for the purpose of determining compliance with any GWP limit.

Pressurized Gas Duster Definition: Currently, the definition for Pressurized Gas Duster describes a product used to remove dust on surfaces that cannot be cleaned with a solvent. In developing the proposal for Pressurized Gas Dusters, staff became aware that there are certain niche uses of these products where flammability is a

**Table ES-2
Proposed New and Modified Definitions**

Previously Unregulated Categories with New VOC Limits	
Astringent/Toner Fabric Softener – Single Use Dryer Product Floor Maintenance Product Motor Vehicle Wash	Odor Remover/Eliminator Pressurized Gas Duster Tire or Wheel Cleaner Windshield Water Repellent
Previously Regulated Category with Lower Limit	
Carpet/Upholstery Cleaner Dusting Aid Fabric Protectant Floor Polish or Wax --Wood Floor Wax Glass Cleaner Multi-Purpose Lubricant Penetrant	Personal Fragrance Product (products with 20% or less Fragrance) Sealant or Caulking Compound-- Chemically Curing Sealant or Caulking Compound-- Non-chemically Curing Spot Remover
Other New or Modified Definitions	
Existing Product Disinfectant Fabric Refresher Global Warming Potential Global Warming Potential Value	Lubricant Metal Polish/Cleanser Not for Retail Sale Volatile Organic Compound

concern. These products rely on a non-flammable propellant with a high GWP. At the present time, no technology exists that would maintain this non-flammable aspect if these products were mandated to comply with our proposed GWP limit for this category. Therefore, we are proposing a modification to the definition for Pressurized Gas Duster to exclude products used on energized equipment as long as the Principal Display Panel specifies “Energized Equipment use only.” As proposed, products so-labeled would neither be subject to the GWP limit nor the VOC limit.

Not for Retail Sale: The current regulation includes several provisions where an exemption from compliance is provided if certain criteria are met. For example, General Purpose Degreasers and Lubricants are not subject to VOC limits if they are sold exclusively to establishments which manufacture or construct good or commodities and are labeled “not for retail sale.” Staff has received numerous inquiries as to what “not for retail sale” means. Therefore, staff is proposing to define this term. As proposed, Not for Retail Sale means that a product is sold exclusively to establishments that manufacture or construct goods or commodities, or are products sold to holders of commercial licenses (e.g. an electrician). For purposes of the regulation, “Not for Retail Sale” means the product is not sold in retail outlets or wholesale locations where household consumers may purchase it.

VOC Definition: We are proposing to modify the definition of VOC to exclude hydrofluoroether (HFE) 7200. HFE 7200 is a solvent used in precision cleaning. In a report titled “Environmental Impact Assessment of Selected Halogenated Chemicals” ARB staff determined that use of HFE 7200 has negligible impacts on ground-level ozone formation. It also has a fairly low GWP. No other adverse impacts were identified (ARB, 2008b). Therefore, to provide an additional reformulation option that could result in further VOC reductions, staff believes the exemption is appropriate.

2. Proposed Amendments to Section 94509

Table of Standards: The proposed regulatory action would amend the existing Consumer Products Regulation by specifying VOC limits for the product categories shown in Table ES-3. Some of the categories are previously unregulated and others are currently regulated. For the currently regulated categories we are proposing lower VOC limits. The new or modified VOC limits would become effective between December 31, 2010 and December 31, 2015, as indicated in Table ES-3. An additional lower limit for Multi-purpose Lubricant is proposed to become effective on December 31, 2015. All of these changes would be reflected in the Table of Standards in section 94509(a). Note that in some cases different VOC limits are proposed based on product form.

Extended effective dates are proposed for categories where the proposed limits, while feasible, will require additional resources to develop complying products. This is especially true for the technology forcing second tier VOC limit proposed for the Multi-purpose Lubricant category. Table ES-3 also shows that statewide VOC emissions would be reduced by about 5.8 tons per day when all limits are fully effective. These reductions would partially fulfill the consumer products element in the Strategy. Several VOC limit proposals in Table ES-3 warrant further explanation as provided below.

- a. Proposal for Fabric Softener-Single Use Dryer Product: Fabric Softener-Single Use Dryer Product is a previously unregulated category. As shown in Table ES-3, a grams of VOC per use limit is being proposed for these products, rather than a percent by weight limit. Our rationale for this proposal is described later in this subsection.
- b. Proposal for Personal Fragrance Products: Staff is proposing that any Personal Fragrance Products with 20 percent or less fragrance be required to meet the existing January 1, 1999, limit of 75 percent by weight VOC limit. This would remove the so called “Grandfather” clause currently contained in subsections 94510(h) and (l). Our proposal is further described in subsection 3 of this Executive Summary.

Table ES-3
Proposed VOC Limits, Emissions, and Reductions at Effective Date

Proposed VOC Limits, Emissions, and Reductions at Effective Date					
Product Category		Product Form	Proposed VOC Limit (percent by weight)	2008 VOC Emissions* (tons per day)	Reductions at Effective Date (tons per day)
Astringent / Toner (non-FDA regulated) ^a		All	35	0.62	0.11
Carpet/Upholstery Cleaner ^a		Aerosol	5	0.32	0.07
		Non-aerosol	1	0.29	0.07
Dusting Aid ^a		Aerosol	17	0.27	0.08
		Non-aerosol	3	0.01	0.00
Fabric Protectant ^a		Non-aerosol	1	0.18	0.08
Fabric Softener – Single Use Dryer Product ^a		All	0.05 grams per use ^{**}	0.52	0.21
Floor Maintenance Product ^a		All	1	0.11	0.07
Floor Polish or Wax – Wood Floor Wax ^a		All	70	0.06	0.01
Glass Cleaner ^b		Aerosol	10	0.33	0.03
Motor Vehicle Wash ^a		All	0.2	0.38	0.14
Multi-purpose Lubricant – excluding solid & semisolid ^{c/e}		All	25 ^c	4.08	2.04
			10 ^e		1.27
Odor Remover/Eliminator ^a		Aerosol	25	***	0.00
		Non-aerosol	6	0.12	0.03
Penetrant ^c		All	25	0.40	0.15
Personal Fragrance Product (products with 20% or less fragrance) ^d		All	75 ⁺	10.89	0.41
Pressurized Gas Duster ^a		All	1	0	0
Sealant or Caulking Compound	Chemically Curing ^b	Non-aerosol	3	1.9	0.22
	Non-Chemically Curing ^a	Non-aerosol	1.5	0.68	0.12
Spot Remover ^a		Aerosol	15	0.76	0.24
		Non-aerosol	3	0.29	0.05
Tire or Wheel Cleaner ^a		Aerosol	8	0.01	0.00
		Non-aerosol	2	0.14	0.06
Windshield Water Repellent ^a		All	75	0.23	0.04
Total Emissions 2008		22.61 tons per day			
Total VOC Reductions 2015		5.76 tons per day			

* Survey emissions adjusted for market coverage,
and grown to the 2008 calendar year

** Grams per use limit provides emissions reductions equivalent
to 2.6% VOC limit, including fragrance

*** Omitted to protect confidentiality

+ Remove "Grandfather" clauses

Effective Dates:

a: 12/31/2010

b: 12/31/2012

c: 12/31/2013

d: 12/31/2014

e: 12/31/2015

- c. Proposal for Furniture Maintenance Product: Although not shown in Table ES-3, staff is proposing to reinstate the long-standing exemption for solid and paste forms of Furniture Maintenance Products. This exemption was inadvertently omitted during the 2006 rulemaking. The exemption clarifies that solid and paste forms of this type of product are not subject to the current VOC limit of three percent by weight.

Proposed Requirement for Dilutable Products: Currently, the VOC limits for products, that are to be diluted prior to use, are applied after the minimum recommended dilution. Staff has become aware of products packaged in pump spray containers that appear to be marketed as “ready-to-use” products, but are designed to be diluted by the user prior to use. Staff believes this approach to packaging may be diminishing anticipated VOC reductions, and is a potential circumvention of the intent of the regulation. Therefore, staff proposes a modification to section 94509(b)(4), clarifying that products sold in pump spray containers are required to meet the specified VOC limit prior to any minimum recommended dilution.

Date Coding Requirements: Subsections 94509 (i), (m), (n), (o) and (p) specify prohibitions on use of certain chlorinated compounds in specified categories. We are proposing to clarify the date coding requirement that must be met to qualify as a “sell-through” product. As proposed, the product would need to comply with the product dating requirements in section 94512(b).

Prohibition of Toxics from Specific Categories: To mitigate a potential adverse environmental impact, staff is proposing a new subsection (q) within section 94509 to prohibit the use of methylene chloride, perchloroethylene, and trichloroethylene in “Carpet/Upholstery Cleaner,” “Fabric Protectant,” “Multi-Purpose Lubricant,” “Penetrant,” “Sealant or Caulking Compound,” and “Spot Remover.”

Under the California Environmental Quality Act (CEQA), ARB is required to identify and mitigate any possible adverse environmental impacts of regulatory actions. We believe that it is unlikely, but possible, that manufacturers may, in response to new VOC limits, choose to reformulate with chlorinated solvents that are TACs. Therefore, because there are many products that comply with the proposed limits, without the use of these chlorinated solvents, prohibiting their use is appropriate to protect the public from exposure to these TACs.

In evaluating the use of these TACs, staff has become aware that certain Penetrants are designed for use on energized equipment. In these situations the products must be non-flammable as a safety precaution. To provide this non-flammable aspect, the chlorinated solvents are used. At the present time, staff is not aware of alternative solvents that can perform this function. Therefore, staff is proposing that Penetrants that include on the Principal Display Panel: “Non-flammable: For use on Energized Equipment Only,” not be subject to this prohibition. They would, however, be required to meet the proposed VOC limits.

Proposal for Pressurized Gas Dusters: The reduction of GHGs in consumer products has been designated as a Discrete Early Action Measure in accordance with AB 32. One of the first consumer product emission sources identified is GHG compounds used in aerosol products. As a first step, staff is proposing, in new subsection 94509(r)(1), that Pressurized Gas Dusters shall not contain any compound that has a GWP of 150 or greater. Staff is also proposing in section 94509(r)(2) that Pressurized Gas Dusters would be provided a one-year sell-through after the effective date of the limits.

In accordance with CEQA, to ensure that the VOC content of these products does not increase as a result of reformulation to meet GWP limits, a one percent by weight VOC limit, including fragrance, is also being proposed for Pressurized Gas Dusters. The proposal would also prohibit use of the TACs, perchloroethylene and methylene chloride.

We are also proposing to specify that any chemical compounds that are present as impurities in an amount, in aggregate, of 0.1 percent by weight or less, are not subject to the GWP limit or toxics prohibition for Pressurized Gas Dusters. Some of the chemical compounds used in Pressurized Gas Dusters may contain very small quantities of contaminants. This provision would allow Pressurized Gas Dusters that contain those contaminants, present at very low levels, to comply with the regulatory provisions.

Staff has also become aware that certain Pressurized Gas Dusters are designed for use on energized equipment. In these situations the products must be non-flammable as a safety precaution. To provide this non-flammable aspect, higher GWP propellants are used. At present time, staff is not aware of alternative propellants that can perform this function. Therefore, staff is proposing that Pressurized Gas Dusters that specify on the Principal Display Panel "Energized Equipment use only" be exempt from compliance with both the VOC and GWP limit.

Requirements for Fabric Softener-Single Use Dryer Product: Staff is proposing a new subsection 94509(s) to describe the VOC content limit for Fabric Softener-Single Use Dryer Product. Rather than a percent by weight limit, a 0.05 grams of VOC per use limit is proposed. The limit is designed to provide a level playing field and to ensure that the size of the sheet substrate does not increase. In developing the limit for these products, staff determined that establishing a percent by weight limit could result in manufacturers using larger size sheets to comply. This would diminish emission reductions and potentially lead to increasing the solid waste stream. Therefore, in accordance with CEQA, the grams per use limit is proposed. The 0.05 grams of VOC limit is designed to provide emission reductions roughly equivalent to a 2.6 percent by weight VOC per use limit, including fragrance. Because the limit already accounts for the fragrance, there is no need to provide the fragrance exemption contained in section 94510(c) for these products. This modification is proposed in section 94510(c).

3. Proposed Amendments to Section 94510, Exemptions (subsections (h) and (l))

At present, Personal Fragrance Products with 20 percent or less fragrance are required to meet an 80 percent or a 75 percent by weight VOC limit, depending on when they first were introduced to the market. Products existing prior to ARB setting these two-tier limits do not need to comply with either limit. Products that were introduced between 1995 and 1999 are required to meet the 80 percent limit, but did not need to reformulate to meet the second-tier January 1, 1999, limit. Only products introduced after January 1, 1999, are required to meet the 75 percent limit. These exemptions, or “Grandfather” clauses, are contained in subsections 94510(h) and (l). Staff is proposing to remove these “Grandfather” clauses. Under this proposal, all Personal Fragrance Products with 20 percent or less fragrance would be required to meet the 75 percent limit effective December 31, 2014. The additional compliance deadline is proposed to account for the large number of products that will need to be reformulated. These proposals are contained in new subsections 94510(h)(3) and (l)(1).

4. Proposed Amendments to Section 94512, Administrative Requirements

Proposed Modification to Product Dating Requirements: Currently, section 94512(b)(1) specifies that a product must clearly display the date or code indicating the date of manufacture. We are proposing language to clarify that a sequential batch number on a product package does not satisfy the product dating requirements.

Proposed Modification to Labeling Requirements: Staff is proposing that non-aerosol Chemically Curing and Non-Chemically Curing Sealant or Caulking Compound products would be required to display the applicable regulatory category and VOC limit as a percent by weight. Because different VOC limits are proposed, staff believes this is necessary to easily distinguish between Chemically Curing and Non-Chemically Curing Sealant or Caulking Compounds for enforcement purposes. This proposal is contained in section 94512(d).

5. Proposed Amendments to Section 94513, Reporting Requirements

Staff is proposing 25 percent by weight VOC limits for Multi-purpose Lubricants and Penetrants, effective December 31, 2013. These are challenging but feasible limits within the time-frame proposed. For Multi-purpose Lubricants staff is proposing a technology forcing 10 percent second tier VOC limit, effective December 31, 2015. To ensure that manufacturers are on track, and that technology advances as expected, staff believes that manufacturers should demonstrate their progress toward meeting these limits.

As proposed in new subsection 94513(f) Multi-purpose Lubricant and Penetrant manufacturers would need to supply by March 31, 2012, detailed written updates on their research and development efforts undertaken to achieve compliance with the 25 percent by weight VOC limits. The reports would include sales and formulation data for products sold in 2011, as well as detailed information on the raw materials evaluated for use, maximum incremental reactivity (MIR) values for any VOC or LVP-VOC used or evaluated, the function of the raw material evaluated, hardware evaluated, testing protocols used, the results of the testing, and the cost of reformulation efforts. A second report on reformulation to meet the 10 percent VOC limit for Multi-purpose Lubricants would be due on March 31, 2014. Sales data would be for calendar year 2013.

Should technical or commercial issues arise, or if it appears reductions could occur within a shorter timeframe, staff would develop appropriate measures to ensure air quality benefits occur as soon as possible.

6. Proposed Amendments to Section 94515, Test Methods

Staff is proposing to clarify that ARB's Method 310 be used as the analytical method to determine GWP content. This method already contains the necessary protocols to analyze for both HFC-152a and HFC-134a content.

H. COMPLIANCE WITH THE PROPOSED AMENDMENTS

Manufacturers of non-complying products will need to reformulate their products to meet the applicable VOC or GWP limits. Manufacturers have the flexibility to choose any formulation that meets the applicable limit and the reformulation options vary with each product category (see Chapter VI of the Technical Support Document). To comply with VOC limits, VOC solvents or propellants will need to be replaced, or partially replaced, with non-VOC ingredients. This may require switching to a water-based formulation, using acetone or another exempt solvent, increasing product solids, or formulating with a non-VOC propellant. Manufacturers may also need to change the valve, container, delivery system, or the other components of the consumer product depending on the individual formulation. ARB staff has proposed VOC limits that can be met without the increased use of toxic air contaminants.

To meet the GWP limit for Pressurized Gas Duster, manufacturers of non-complying products will need to substitute a lower GWP propellant for the currently used higher GWP propellant. We expect that manufacturers will substitute HFC-152a for HFC-134a. We are also proposing a VOC limit for Pressurized Gas Duster products to ensure that VOC emissions do not increase as products reformulate. Because HFC- 152a is an exempt VOC, meeting a 1 percent VOC limit is very feasible.

Table ES-4 summarizes, for the proposed VOC limits, data related to the complying market-shares (based on sales), as well as the number of products that currently comply relative to total number of products reported.

Table ES-4
Summary of Complying Products and Complying Marketshares

Product Category		Product Form	Proposed VOC Limit (wt%)	Number of Complying Products/ Total	Complying Market Share (%)
Astringent / Toner (non-FDA regulated)		All	35	177 / 203	70
Carpet/Upholstery Cleaner		Aerosol	5	7 / 59	10
		Non-aerosol	1	54 / 117	25
Dusting Aid		Aerosol	17	13 / 41	5
		Non-aerosol	3	33 / 38	74
Fabric Protectant		Non-aerosol	1	42 / 63	95
Fabric Softener – Single Use Dryer Product		All	0.05 grams per use*	20 / 26	24
Floor Maintenance Product		All	1	57 / 98	53
Floor Polish or Wax – Wood Floor Wax		All	70	*** / 7	***
Glass Cleaner		Aerosol	10	32 / 95	37
Motor Vehicle Wash		All	0.2	311 / 366	89
Multi-purpose Lubricant – excluding solid & semisolid		All	25	38 / 176	4
		All	10	22 / 176	3
Odor Remover/Eliminator		Aerosol	25	*** / ***	100
		Non-aerosol	6	154 / 184	82
Penetrant		All	25	14 / 84	30
Personal Fragrance Product (products with 20% or less fragrance)		All	75**	679 / 1101	37
Pressurized Gas Duster		All	1	89 / 90	> 99
Sealant or Caulking Compound	Chemically Curing	Non-aerosol	3	95 / 196	23
	Non-Chemically Curing	Non-aerosol	1.5	201 / 344	76
Spot Remover		Aerosol	15	18 / 70	4
		Non-aerosol	3	231 / 261	94
Tire or Wheel Cleaner		Aerosol	8	*** / 8	***
		Non-aerosol	2	63 / 102	69
Windshield Water Repellant		All	75	*** / 30	***

Source: 2003 Consumer and Commercial Products Survey (ARB, 2004a) grown to 2008, and the 2007 Pressurized Gas Duster Survey Update

* Grams per use limit provides emissions reductions equivalent to 2.6 percent by weight VOC limit, including fragrance

** Remove “Grandfather” clauses

*** Omitted to protect confidentiality

Manufacturers can also comply with the proposed amendments through the use of the Innovative Products Provision (IPP), or the Alternative Control Plan (ACP). The IPP allows manufacturers of “innovative products” to comply with the Consumer Products Regulation if they demonstrate through clear and convincing evidence that their product will result in less VOC emissions than a complying product that meets the applicable VOC limit. The innovative product may result in less emissions due to some characteristic of the product formulation, design, delivery system, or other factors.

The ACP allows manufacturers to average the emissions from products above and below the applicable VOC limits, as long as the overall emissions are less than or equal to the emissions that would have occurred had all the products complied with the VOC limits. Manufacturers must submit an application which includes the VOC content of the products in the plan, a method of verifying the sales of each product in the plan, and other information necessary to track overall emissions.

Although not shown in Tables ES-4, the complying market-share (based on sales) for the GHG limit for the Pressurized Gas Duster category is 86 percent. Moreover, 18 of 90 products currently comply with the GWP limit of 150. Based on these complying market-shares and the number of complying products, staff believes the proposed VOC and GHG limits are commercially and technologically feasible.

I. ECONOMIC IMPACTS

Staff evaluated the costs to comply with the proposed limits for potential impacts on profitability and other aspects of businesses (with particular attention to California businesses), the cost-effectiveness (CE) of the limits, and the estimated cost impacts to consumers. Chapter VII of the Technical Support Document contains a more thorough assessment of the economic impacts associated with the proposal.

CE is one measure of a regulation’s efficiency in reducing a given amount of pollutant (often reported in “dollars spent per pound of pollutant reduced”). Based on our analyses, we estimate the cost-effectiveness of the proposed VOC limits is about \$6.23 per pound VOC reduced. This CE is higher than most other consumer product regulations. For example, the CE of amendments proposed in 2004 and 2006 was about \$2.40 and \$2.35, respectively, per pound of VOC reduced, over a 10-year lifetime. However, the CE of other consumer product rulemakings has been comparable to this proposal. For example, the CE of amendments related to aerosol adhesives in 2000, was about \$6.00 per pound of VOC reduced.

The CE for the proposed amendments reflects that VOC reductions from consumer products are becoming more difficult to achieve. A number of smaller emitting categories are being proposed for regulation, with resulting small reductions. Several categories are relatively costly because large numbers of products need to be reformulated to achieve fairly low VOC emission reduction totals.

It was further determined that the cost of the measure to reduce GHG from Pressurized Gas Duster products is about \$450,000 over ten years, or \$45,000 per year. This yields a CE of about \$0.22 per metric ton of carbon dioxide equivalents. The cost is fairly low because, as described below, the raw materials used in the reformulation are considerably less expensive than those currently used.

The estimated costs were derived using methodologies previously used for the Consumer Products Regulations and Cal/EPA guidelines for conducting cost analyses for major regulations. We determined that the regulation would cost businesses and individuals about \$260 million over the 10-year lifetime. Because the costs incurred by industry to comply with this rulemaking are about \$26 million per year, for ten years, it is considered a major regulation. The cost estimates are based on assumptions specific to each category depending on reformulation needs. For some categories it was assumed that manufacturers would either drop certain products or undergo minor product formulation changes, and for other categories, manufacturers would undergo complete production line overhaul and equipment replacement rather than simple re-tooling.

Staff believes that the regulation cost and CE determination methodologies are quite conservative, and are thus in most cases over-estimated. There are several factors that contribute to the over estimation of costs. The mid-range cost (used to determine the overall cost and cost effectiveness of the regulation), is the average of the estimated high and low cost scenarios. The low cost scenario assumes that companies would choose the lowest cost reformulation pathway, making minor adjustments to a product's formulation, or simply eliminating higher VOC products. We believe that most manufacturers would choose the lowest cost reformulation option. For the high cost scenario, it is assumed that there is significant research and development, and new equipment is needed to reformulate the product. We believe that few manufacturers would need to take the high cost reformulation approach.

In the economic analysis, staff determined that the VOC limits for Multi-purpose Lubricants would be the most challenging and costly to comply with. Staff separately calculated the estimated costs of reformulation for each of the proposed tiers of the Multipurpose Lubricant proposal. Further, cost estimates were performed separately for aerosol and non-aerosol products respectively. The analysis shows that greater costs will be incurred during the first tier reformulation than the second tier reformulation. This results from the assumption that significant high end costs will be incurred in the first tier reformulation, but not all of these costs would necessarily be duplicated in the second tier reformulation. If major plant modifications or new equipment purchases are needed to meet either tier of the VOC limits, a manufacturer would likely choose to make these significant changes during one plant modification, rather than making significant changes more than once. In fact, certain companies may choose to reformulate only once, (i.e. reformulate to meet the second tier VOC limit before 2013.) Regardless of whether this assumption is correct, we believe that it is appropriate to assume that high end reformulation costs will be incurred during either the first tier reformulation or the second tier reformulation, but not both. Either assumption, that higher costs would be

incurred during a given tier relative to the other, would yield the same amount of total costs being incurred to meet both tiers.

Another factor that can contribute to an over-estimation of costs is the assumptions used for the raw ingredient costs of the reformulated products. For the product categories for which VOC limits are proposed, we assumed that if the raw ingredients used in the reformulated product yielded a cost savings, the cost of the ingredients necessary to meet the new VOC limit is zero. This is an appropriate, conservative assumption because there are many reformulation options. However, in the case of Pressurized Gas Dusters we assumed that reformulation would yield a raw material savings, and incorporated the decreased cost in to the overall cost estimate. We believe that this approach is appropriate because, in order to comply with the proposed GWP limit for Pressurized Gas Dusters, there is only one identified reformulation pathway, replacing HFC-134a with HFC-152a. Because HFC-152a is less expensive per pound than HFC-134a, it is appropriate that there would be a cost savings in virtually every case.

Consumers may have to pay more for some products subject to the proposed amendments, depending on the extent to which manufacturers are able and do pass along their costs to consumers. The average increase in cost per unit to the manufacturer is estimated to be about \$0.03. This estimated cost increase per unit value is lower than the estimate derived for the 2006 Amendments. In that rulemaking, we found the average cost per unit increase to be about \$0.17 per unit.

Based on our analysis, we expect most manufacturers to be able to absorb the added costs of the proposed regulation without an adverse impact on their profitability. However, it is likely that manufacturers would pass along some of their costs to product purchasers, thus lowering the impacts to business.

We also estimated the change in “return-on-owner’s equity” (ROE) as an indicator of the proposed limits’ potential impacts on business profitability. The cost to comply with the proposed regulation, through increased research and development, equipment purchase and other investment costs, is presumed to impact a business’ ROE and, therefore, its profitability. Our analysis indicates the estimated change in ROE is about a 0.7 to 4.0 percent change. The average change in ROE is about 2.5 percent, relative to the current situation. A reduction of more than ten percent in profitability is considered to indicate a potential for adverse impacts.

Our ROE analysis for the proposed limits may overestimate the impact on business because it assumes that all of the costs of the proposed limits will be absorbed by manufacturers. In reality, we expect that at least some of the investment costs to comply with the proposed limits will be passed on to consumers. The analysis presumes that some cost mitigation will occur due to “technology-transfer” between product lines and from third-party manufacturers (i.e., contract fillers) who fill essentially equivalent products for a number of competing businesses.

While we expect that most businesses will be able to absorb, or pass through, the costs of the proposed amendments without significant adverse impacts on their profitability, there is the possibility that some individual businesses will be adversely affected by this regulatory action. Therefore, it is possible that the proposed amendments may have a significant adverse impact on some businesses that are not in a market position to invest monies to develop complying products, or to absorb and/or pass through the increased cost resulting from their compliance with the proposed amendments.

Based on our analysis, we do not expect the proposed amendments to have a significant impact on employment, or business creation, elimination, or expansion. We also do not expect the regulation to have a significant impact on the competitiveness of California businesses compared with those outside of California. This is because all companies that sell these products in California would have to meet the proposed requirements, whether located in California or outside of California.

The Air Resources Board (ARB) would have costs associated with adoption of the proposed amendments. Adoption of the amendments would necessitate an increase in ARB staff to properly enforce the Consumer Products Regulation. These proposed amendments are setting new limits for a number of previously unregulated categories. It has been determined that to enforce these new limits, two ARB staff will be needed. This would result in an increased cost to the State of approximately \$300,000 per year.

J. ENVIRONMENTAL IMPACTS

The proposed amendments would reduce VOC and air toxic emissions. The proposed amendments would also reduce the use of compounds with high GWP in Pressurized Gas Duster products. Because of this, staff has determined that the amendments would have an overall positive impact on the environment. No significant adverse impacts were identified. We evaluated the effects of these reductions, as well as the other proposed amendments, on ground-level ozone concentrations, climate change, stratospheric ozone depletion, air toxic emissions, water quality, solid waste disposal, and energy use. A complete analysis of potential environmental impacts is contained in Chapter VIII of the Technical Support Document.

Because VOCs are ozone precursors, the VOC reduction of 5.8 tons per day would result in reductions in ozone concentrations. If we assume that the average ozone forming potential of consumer product VOC emissions is about 1.50 pounds of ozone per pound of VOC emitted (based on the MIR scale, title 17, CCR, sections 94700-94701), then we predict the resulting ozone reductions would be about 9 tons per day. No other significant positive or negative impacts were identified.

The expected reduction in use of compounds with high GWP would be equivalent to reducing 0.20 MMT of CO₂ per year. This reduction will help meet California's desire for early reductions and also assist in meeting our 2020 target. All technologically

feasible cost-effective reductions need to be pursued to meet the requirements of AB 32. Because we are proposing to establish a VOC limit for Pressurized Gas Dusters, no increase in VOC emissions will occur. No increased use of TACs would occur because the proposal would also prohibit use of methylene chloride and perchloroethylene. Related to solid waste, reformulated products are potentially more efficient than existing products, so a reduction in the solid waste stream should occur (DuPont and Falcon, 2004). No other significant positive or negative impacts were identified.

The proposal would also prohibit the use of the TAC solvents methylene chloride, perchloroethylene, and trichloroethylene in six categories (except in certain niche applications where non-flammable products are needed). Exposure to these air toxics would be reduced by about 0.2 tons per day. The prohibition is proposed as a mitigation measure under CEQA. The prohibition would ensure that manufacturers will not switch to using these solvents as a reformulation option. However, it is likely that this could lead to a very slight increase in VOC emissions because products currently formulated with these TAC compounds would have to replace them—likely with VOC ingredients. Staff has determined that the reduction in exposure to these carcinogens outweighs the very small potential increase in VOC emissions. No other significant positive or negative impacts were identified.

The proposal to exempt HFE 7200 from the definition of VOC should have an overall benefit in reducing VOC emissions and stratospheric ozone depleting emissions. HFE 7200 could be a suitable substitute for some VOCs, and can be used to replace stratospheric ozone depleting compounds such as HCFC-141b. No other significant positive or negative impacts were identified.

Related to solid waste and energy impact, no significant impacts were identified. However, it has been suggested that end-use consumers of Fabric Softener-Single Use Dryer Products may begin using more than a single sheet per drying cycle, or may switch to using the liquid product form. This could result in more dryer sheets being land-filled, and/or increased transportation costs because of the differential in weight between liquid and dryer sheet products. However, no data were provided to support these claims. As is always done, we intend to monitor product sales trends to ensure that unintended consequences of establishing the proposed VOC limit do not occur.

Other language and definitional changes proposed should have an overall positive impact because these provisions are designed to aid in enforcing the regulation.

This proposal is consistent with the ARB's Environmental Justice Policy to reduce health risks in all communities, including low-income and minority communities. Generally, use of consumer products is fairly uniform across the State, tracking with population, and their emissions are spread over the course of a day, rather than concentrated at a particular time of day. For these reasons, we do not believe that people of any given race, culture, or income would be more impacted than any others

would. All Californians should benefit equally from the reduction in VOC, GHG and TAC emissions from the consumer product categories proposed for regulation.

K. FUTURE PLANS

Future activities include continued review of the 2006 Consumer Products Survey. This survey will serve as the basis for additional VOC and GHG reductions measures for consumer products. Additional reductions are needed to meet consumer product reduction commitments in the Strategy and as a Discrete Early Action Measure under AB 32. Work is also ongoing to assess the most feasible approach to regulating Paint and Lacquer Thinner, and evaluating exposure to TACs used in Nail Coatings.

The Strategy also includes a longer term commitment to assess innovative measures to further reduce VOC emissions from consumer products.

L. RECOMMENDATION

We recommend that the Board adopt the proposed amendments to the Consumer Products Regulation.

REFERENCES

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Appendix A

Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation

Technical Support Document

I. INTRODUCTION

A. OVERVIEW

In this rulemaking, California Air Resources Board (ARB or Board) staff is proposing amendments to the California Consumer Products Regulation. The amendments are designed to reduce volatile organic compound (VOC) and air toxic emissions. The amendments would also reduce the use of compounds with high global warming potential (GWP) in consumer products. The regulation is codified in title 17, California Code of Regulations, sections 94507-94517. The proposed amendments to reduce VOC emissions would partially fulfill the consumer product reduction commitment contained in the State Strategy for California's 2007 State Implementation Plan. The proposed amendment to reduce the use of high GWP compounds is designed in accordance with the Discrete Early Action Measure requirements set forth in the California Global Warming Solutions Act of 2006 (AB 32).

As proposed, other amendments would exclude a compound from the definition of VOC, language modifications would clarify and improve existing regulatory provisions, and use of toxic air contaminants (TACs) in seven categories would be prohibited. The toxics prohibition is a mitigation measure, as required by the California Environmental Quality Act (CEQA), to ensure that certain TACs are not used as products are reformulated to meet new limits.

This Technical Support Document, Appendix A, presents ARB staff's technical justification and analysis of the proposed amendments. It is part of the Initial Statement of Reasons (ISOR) for Proposed Amendments to the California Consumer Products Regulation. The proposed amendments can be found in Appendix B of this document. Appendix E provides a complete list of the acronyms used in this ISOR.

Included in this Technical Support Document is the following information:

- background information on the consumer products program related to the control of VOC and greenhouse gas (GHG) emissions;
- information on the process used to develop the proposed amendments;
- an assessment of why the proposed amendments meet the requirements of State law;
- a review of the emissions from the categories proposed for regulation and the overall need for the emission reductions;
- a description of the proposed amendments;
- an analysis of the environmental and expected economic impacts from the proposed amendments; and
- a summary of future activities.

B. ENABLING LEGISLATION

In 1988, the California Clean Air Act (CCAA or “the Act”) became law to address the State’s serious air pollution problems and the inability of many areas in California to attain the State and federal ambient air quality standards. The CCAA added section 41712 to the California Health and Safety Code. Section 41712, along with subsequent amendments, requires ARB to adopt regulations to achieve the maximum feasible reduction in VOC emissions from consumer products. Prior to adoption, the Board must determine that adequate data exist to establish both of the following:

- the regulations are necessary to attain State and federal ambient air quality standards; and
- the regulations are commercially and technologically feasible.

Section 41712 defines a consumer product as a chemically formulated product used by household and institutional consumers. Consumer products include, but are not limited to: detergents; cleaning compounds; polishes; floor finishes; cosmetics; personal care products such as antiperspirants and hairsprays; home, lawn, and garden products; disinfectants; sanitizers; automotive specialty products; and aerosol paints. Other paint products, such as furniture or architectural coatings, are not part of ARB’s consumer products program because local air districts regulate them.

The Act further stipulates that regulations adopted must not eliminate any product form, and that recommendations from health professionals be considered when developing VOC control measures for health benefit products. Health and Safety Code section 41712, gives ARB authority to control emissions from a very diverse number of products sold statewide to household and commercial consumers. The primary goal of this section was to set forth a program to reduce ground-level ozone concentrations, as part of the overall effort to attain ambient air quality standards.

In 2006, Assembly Bill (AB) 32 was signed into law. This law created a comprehensive, multi-year program to reduce global warming compound emissions in California. AB 32 added section 1. division 25.5 (commencing with section 38500) to the California Health and Safety Code. These sections require ARB to develop regulations and consider market mechanisms that will ultimately reduce California’s GHG emissions equivalent to the 1990 baseline year by 2020. Among other things, AB 32 requires ARB to make immediate progress towards the reduction of GHG emissions. Specific Discrete Early Action Measures are to be identified and regulations are to be adopted and enforceable by January 1, 2010. Beyond the requirements of AB 32, the Governor’s Executive Order EO-S-03-05 calls for an additional GHG reduction of 80 percent by 2050.

C. BACKGROUND

1. Existing Consumer Product Regulations

To date, the Board has taken numerous actions to fulfill the legislative mandate pertaining to the regulation of VOCs in consumer products, including antiperspirants, deodorants, and aerosol coating products. Three regulations have been adopted that affect 115 consumer product categories by setting 150 VOC limits. These limits have resulted in reducing emissions by about 200 tons per day, an overall 44 percent reduction in VOC emissions. We have also reduced exposure to TACs. Emissions of TACs have been reduced by 13 tons per day by prohibiting use of certain chlorinated compounds in 63 categories. In addition, two voluntary regulations, the Alternative Control Plan and the Hairspray Credit Program have been adopted to provide compliance flexibility to companies. These five regulations are codified in title 17, California Code of Regulations, sections 94500 to 94575:

- Antiperspirants and Deodorants (Article 1, sections 94500-94506.5);
- Consumer Products (Article 2, sections 94507-94517);
- Aerosol Coating Products (Article 3, sections 94520-94528);
- Alternative Control Plan (Article 4, sections 94540-94555); and
- Hairspray Credit Program (Article 5, sections 94560-94575).

Regulation of consumer products began in 1989 with adoption of the Antiperspirants and Deodorants Regulation. The “general” Consumer Products Regulation was approved in 1990 and has been amended numerous times. The most recent amendments to the Consumer Products Regulation were approved in 2004 and 2006 (ARB, 2004b; ARB, 2006a). The Aerosol Coatings Regulation was adopted in 1995 and was amended in 2000. A complete summary of consumer products program regulatory actions with dates of regulatory amendments are provided in Appendix C.

2. Consumer Products and the State Implementation Plan (SIP)

State Implementation Plans

Federal clean air laws require areas with unhealthy levels of ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide and inhalable particulate matter to develop State Implementation Plans (SIPs) describing how they will attain national ambient air quality standards (NAAQS).

A SIP is a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), local air district rules, and State and federal regulations. Many of California's strategies apply statewide, including emission standards for cars and heavy-duty trucks, fuel regulations, and limits on emissions from consumer products. State law designates ARB as the lead agency for all purposes

related to the SIP. Local air districts and other agencies, such as the Department of Pesticide Regulation, prepare SIP elements and submit them to ARB for review and approval. ARB forwards SIP revisions to the United States Environmental Protection Agency (U.S. EPA) for approval and publication in the Federal Register. The Code of Federal Regulations Title 40, Chapter I, Part 52, Subpart F, Section 52.220 lists all of the items which are included in the California SIP. Some California SIP submittals are pending U.S. EPA approval.

Consumer product VOC emissions are known to contribute to concentrations of both ground-level ozone and particulate matter with diameters of 2.5 micrometers or less (PM_{2.5}). The link between consumer product VOC emissions and ground-level ozone concentrations is well-established, and quantified. However, their impact on PM_{2.5} concentrations is less clear. Because VOCs are ozone precursors, specific consumer product control measures have been developed related to ozone control. These measures have been included in SIPs. For this reason, our summary here focuses on consumer product strategies that have been, and are, designed to meet ambient air quality standards for ozone.

1994 California State Implementation Plan for Ozone

On November 15, 1994, the ARB adopted the California State Implementation Plan for Ozone (1994 SIP). This plan included measures designed to meet the previous federal peak one-hour ozone standard of 0.12 parts per million (ppm). Achieving significant VOC reductions from consumer products was a key element of the 1994 SIP. Several rulemakings were proposed and adopted to work toward meeting the SIP commitment.

2003 State and Federal Strategy and 2003 South Coast SIP

On October 23, 2003, the ARB adopted the 2003 Statewide Strategy, which identified the Board's near term regulatory agenda to reduce ozone and particulate matter and to adopt new measures for each year from 2003 to 2008. The ozone control elements were again designed toward attainment of the federal one-hour ozone standard.

The 2003 SIP contained two measures for consumer products. These measures were designated as CONS-1 and CONS-2, and are summarized below.

- Measure CONS-1: Set New Consumer Products Limits for 2006.

The CONS-1 measure was designed to achieve VOC emission reductions from consumer products of at least 2.3 tons per day in the South Coast Air Basin and 5.3 tons per day statewide by 2010. On June 26, 2004, the Board approved a CONS-1 measure (the "2004 Amendments"), which will achieve 3.0 tons per day in VOC emission reductions in the South Coast Air Basin by 2010, and achieve 6.9 tons per day in VOC emission reductions statewide by 2010 (ARB, 2004b). The CONS-1 measure

became legally effective on June 20, 2005. As of this writing, all but one of the CONS-1 VOC limits are in full effect. The CONS-1 commitment has been fulfilled.

- Measure CONS-2: Set New Consumer Products Limits for 2008-2010.

The ARB also committed to present new consumer product category limits to the Board between 2006 and 2008 to achieve VOC emission reductions from consumer products of between 8.5 tons per day and 15 tons per day in the South Coast Air Basin by 2010. Statewide, the CONS-2 measure was to achieve 20-35 tons per day in emission reductions by 2010. Amendments to the Consumer Products Regulation in 2006, which will result in reductions of 4.9 tons per day in South Coast and 11.5 tons per day statewide, partially fulfilled this commitment (ARB, 2006a).

The 2003 SIP was withdrawn from consideration and is no longer in effect. However, the remaining commitment from the CONS-2 measure has been incorporated in the 2007 Strategy commitment which is described below.

State Strategy for California's 2007 State Implementation Plan (Strategy)

In July 1997, U.S. EPA established a new federal ozone standard. As opposed to a one-hour peak ozone standard, the new ozone standard established a limit of 0.08 ppm averaged over eight hours (U.S. EPA, 1997). On April 15, 2004, U.S. EPA designated 15 areas as non-attainment in California for the eight-hour ozone standard (U.S. EPA, 2004). Many, but not all of these areas were also designated as non-attainment for the federal one-hour standard. New non-attainment areas include a number of rural Sierra Nevada foothill counties and additional parts of the Sacramento Valley. The one-hour standard was revoked on June 15, 2005, one year after the effective date of the designation, and SIPs showing how each area will meet the eight-hour standard were submitted to U.S. EPA in 2007.

To address the eight-hour standard, the Strategy was adopted at the September 25, 2007 Board hearing (ARB, 2007d). This is a comprehensive Strategy designed to attain federal air quality standards through technologically feasible, cost effective, and far reaching measures. The Strategy describes the scope of the State's ozone and PM_{2.5} non-attainment problems and sets forth ARB's plan on how California can comply with federal standards.

The Strategy is the first plan designed to show how California will meet the national eight-hour ozone standard. Because the eight-hour standard is more stringent than the one-hour standard, U.S. EPA set presumptive deadlines that allow more time for attainment. Nonetheless, the measures California has adopted to meet the one-hour standard remain in place and will deliver substantial new reductions over the next few years.

Specific to consumer products, in the Strategy ARB committed to reducing consumer product VOC emissions by 30 to 40 tons per day by 2014. To achieve this

commitment, rulemakings are to be initiated in the 2007 to 2008 timeframe with limits becoming effective between 2010 and 2012. These actions are to be followed with additional rulemakings in the 2010 to 2012 timeframe. Reductions are to occur between 2012 and 2014 (ARB, 2007d).

Further reductions from consumer products are important because VOC emissions from consumer products are predicted to become the largest source of VOC emissions in the South Coast Air Basin, and the third largest source in the San Joaquin Valley Air Basin by 2020. The Strategy, in combination with local actions, provides emission reductions necessary to meet the eight-hour ozone standard in these two most challenging regions.

VOC reductions from consumer products are becoming more difficult to achieve. In light of this, the Strategy includes a commitment to explore innovative reduction strategies in the longer term. One such measure would include investigating emission reduction opportunities through reactivity-based standards. A reactivity-based approach relies on the scientific principle that different chemical compounds react to form different amounts of ozone in the atmosphere. Reactivity-based standards reduce emissions of the most photochemically reactive compounds.

Alternative market-based mechanisms would also be explored to encourage the development, distribution, and purchase of cleaner, very low, or zero emitting products. Examples of mechanisms to explore are an environmental product labeling program, programs where companies set their own emission reduction goals, and the use of print and broadcast media for public education. If these mechanisms cannot produce meaningful emission reductions from the consumer products source category, then other approaches would be evaluated. Some of these approaches include the purchase of VOC emission credits; and funding of special projects to reduce emissions or accelerate reductions from pollution sources outside of the consumer products industry.

Future State Implementation Plans

Up-to-date information on SIP activities can be found on ARB's website at: <http://www.arb.ca.gov/planning/sip/sip.htm>. On March 12, 2008, U.S. EPA reduced the eight-hour "primary" ozone standard to a level of 0.075 ppm. U.S. EPA also strengthened the secondary eight-hour ozone standard to the level of 0.075 ppm, making it identical to the revised primary standard. The final rulemaking is to be effective on May 27, 2008. These changes will improve both public health protection and the protection of sensitive trees and plants. Because California's eight-hour air quality standard for ozone is lower still, additional measures beyond those to meet the federal standard will be needed.

3. Consumer Products and the California Global Warming Solutions Act of 2006 (AB 32)

Various consumer products may contain GHGs in their formulations. Most often these GHGs are propellants such as hydrofluorocarbons (HFCs) and carbon dioxide (CO₂). To a lesser extent some GHGs are used as solvents.

As mentioned earlier, AB 32 requires immediate progress, described as Discrete Early Action Measures. These measures require ARB to identify and adopt regulations to reduce GHG emissions. These early actions are to be enforceable by January 1, 2010. Reduction of compounds with high GWP used in consumer products has been designated as a Discrete Early Action Measure. Therefore, as a Discrete Early Action measure, ARB staff has committed to eliminate or reduce the use of GHG compounds with high GWP that are used in consumer products. The GHG emission reduction from consumer products is estimated to be 0.25 million metric tons of CO₂ equivalents (this metric is described in Chapter IV) or more, if feasible.

4. National Consumer Products Regulations

On September 11, 1998, U.S. EPA promulgated a national consumer products regulation, the “National Volatile Organic Compound Emission Standards for Consumer Products (40 CFR Part 59, Subpart C, Sections 59.201 et seq.; see the September 11, 1998, Federal Register, Vol. 63, No. 176, pages 48819-48847).” (U.S. EPA, 1998). This action set national VOC emission standards for 24 categories of consumer products. The rule became effective on September 11, 1998, and the VOC limits became effective on December 10, 1998. There are similarities and differences between the California and national consumer products regulations; however, the national rule does not preclude states from adopting more stringent regulations.

In the summer of 2006 U.S. EPA began work on amendments to their existing national consumer products rules. Their amendments are based on California’s CONS-1 (2004 Consumer Products Regulation Amendments) categories and limits. The amendments are expected to become effective on January 1, 2009.

U.S. EPA has also recently promulgated a national rule for aerosol coatings (spray paints) based on ARB’s Aerosol Coatings Regulation. This is a reactivity-based regulation. The national aerosol coatings rule will become effective on January 1, 2009. (U.S. EPA, 2007).

Although the national consumer products rule is similar in many aspects to the California regulation, it is less effective in reducing VOC emissions from consumer products. The national regulations are generally less stringent than ARB’s and apply to fewer categories. The existing national consumer products rule achieves a 20 percent reduction in VOC emissions, while California’s existing consumer products and aerosol coatings regulations have already achieved a 50 percent reduction in the regulated categories. The federal regulation also does not prohibit use of any toxic compounds.

The California Consumer Products Regulation has prohibited use of certain toxic compounds in 63 categories, resulting in a reduction of toxic compound emissions of 13 tons per day. Because California has unique air quality problems, reducing VOC emissions from all categories, including consumer products, to the maximum extent feasible, is necessary to attain the federal and State ambient air quality standards for ozone.

There are no national consumer products rules related to reducing GHG emissions.

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II. DEVELOPMENT OF PROPOSED AMENDMENTS

This Chapter contains a description of the public process used to develop the proposed amendments. The Administrative Procedures Act (APA) (Government Code section 11340 *et seq.*) requires that development of regulations must allow for public input. This Chapter also describes the staff's evaluation of emission reduction opportunities, and alternatives to the final proposal that were considered.

A. PUBLIC PROCESS FOR DEVELOPING PROPOSED LIMITS

In this Chapter, we describe our process to involve the public in developing the proposed amendments, and the staff's evaluation of emission reduction strategies. In order to involve the public, the Consumer Products Regulation Workgroup (CPRWG), was established in 2004. Participation in the CPRWG was, and continues to be open to any member of the public. The CPRWG participated in the development of the 2003 Consumer and Commercial Products Survey (2003 Survey), which serves as the basis for this proposal. The CPRWG was also instrumental in the development of the 2004 and 2006 amendments, as well as these proposed amendments.

Further outreach, beyond the CPRWG, was conducted to identify and involve stakeholders in the development of the Discrete Early Action Measure for greenhouse gas reductions. As part of the process, in February 2008, ARB conducted a survey update for the Pressurized Gas Duster category. The intent of the survey update was to evaluate propellant technology and to update sales data for the 2007 calendar year. The survey was conducted in response to comments from stakeholders that indicated the market for Pressurized Gas Dusters had changed since our 2003 Survey.

Consumer product manufacturers, chemical producers, marketers, trade associations, and various other stakeholders listed below, have actively participated in the process.

- Adhesives and Sealants Council
- Alliance for Responsible Atmospheric Policy
- American Beauty Association
- American Chemistry Council
- Automotive Aftermarket Industry Association
- Automotive Specialty Products Association
- California Fire Chief Association
- California Grocers Association
- California Healthy Nail Salon Collaborative
- California League of Food Processors
- Coalition for Clean Air
- Consumer Specialty Products Association
- Cosmetic, Toiletry, and Fragrance Association (now known as Personal Care Products Council)
- Environmental Working Group

- Fire District Association of California
- Fragrance Materials Association
- Institute for Research and Technical Assistance
- International Sanitary Supply Association
- Motor & Equipment Manufacturers Association
- National Aerosol Association
- National Paint and Coatings Association
- Soap and Detergent Association
- Western Aerosol Information Bureau

Representatives from local air districts and agencies, including the South Coast Air Quality Management District and the United States Environmental Protection Agency were also involved in the process.

ARB staff maintains a mailing list of over 5,000 companies and interested parties, including environmental organizations, which received information throughout the development of the proposed amendments. We have established an electronic list serve, which has over 1,300 subscribers, to allow subscribers to receive pertinent information. We also have a public website for the 2008 Consumer Products Regulatory Work Group Activity.

Among other things, these amendments address categories that were deferred from the 2006 rulemaking as a result of input from stakeholders. Numerous issues were raised that required additional evaluation and analysis in these categories. In addition to the outreach for the 2006 rulemaking, a public CPRWG meeting and an additional public workshop were conducted on August 29, 2007 and March 5, 2008, respectively, to develop this proposal.

On August 23, 2007, staff posted the first proposal for the 2008 Consumer Products Regulation Amendments to the CPRWG activity website. These proposals were discussed at the CPRWG meeting on August 29, 2007. At the meeting, staff discussed the draft regulatory categories, proposed limits, and the rulemaking timeline. The meeting served as a forum for stakeholder comments on the proposals and schedule.

On January 11, 2008, staff posted a revised table of proposed limits, for further review and comment. This proposal reflected some modifications based on comments received at the August 2007 CPRWG meeting.

A public workshop for this rulemaking was held on March 5, 2008. Materials describing the proposals were posted to the website on February 29, 2008. At the workshop, staff described proposals for modifications to the Consumer Products Regulation. These included the proposed definitions and volatile organic compound (VOC) limits, the toxics prohibition proposal, a Discrete Early Action greenhouse gas Measure (GHG), and a proposal to exclude a compound from the VOC definition.

To solicit additional information and comments, staff held numerous individual meetings, and teleconferences, with stakeholders. At several of these meetings, requested by industry associations, industry representatives presented technical information related to reformulation of products for which VOC and GHG limits are proposed. Staff also reviewed survey data, performed shelf surveys, and researched technical literature, patents, and trade journals during the development of this proposal.

B. STAFF EVALUATION OF EMISSION REDUCTION OPPORTUNITIES

Development of the proposed amendments began with the review of the 2003 Survey. The 2003 Survey collected information on about 250 categories of consumer products. These 250 categories comprise about two-thirds of the overall consumer products emissions inventory, or about 160 tons per day. Over 915 companies responded to the 2003 Survey with information on over 26,000 products (ARB, 2004a). The 2003 Survey, in conjunction with the recently conducted 2006 survey, and the 2007 Pressurized Gas Duster Survey Update, conducted in 2008 (ARB, 2008c), are designed to obtain the comprehensive information necessary to develop new consumer product emission standards that together would achieve a minimum VOC emission reduction of 30 to 40 tons per day by 2014, and GHG emission reductions equivalent to reducing an estimated 0.25 million metric tons of CO₂ (MMT CO₂e) by 2020 (see Chapter I, Section C. Background).

The focus of the 2003 Survey was primarily on categories where an opportunity for emission reductions was identified. After the 2003 Survey data were compiled, staff prioritized product categories for possible regulation. This process began with the elimination of categories where staff believed no viable opportunity for reduction existed at the current time. As a result of this process, staff initially identified 61 product categories for potential emission reduction opportunities which included 21 previously unregulated categories. As a result, in 2006, lower VOC limits were set for 13 previously regulated categories and new VOC limits were set for 3 categories.

In this same timeframe, staff postponed consideration of some product categories to provide adequate time to evaluate the feasibility of VOC reductions and/or time to address technical issues. In addition, staff revised emission estimates to address product mis-categorization, products that were already regulated under local air district rules, and reporting errors. The categories that are the subject of this rulemaking were primarily those that were postponed in the 2006 rulemaking. Further evaluation of the 2003 Survey data indicated that it was also possible to reduce the use of compounds with high GWPs in Pressurized Gas Dusters.

During the workgroup and workshop process, staff presented specific proposals and alternatives to the public for consideration. The proposed amendments were developed based on the 2003 Survey results, as well as the results from the 2007 Pressurized Gas Duster Survey Update conducted in early 2008.

Staff also identified an additional VOC emission reduction possibility. In March 2008, a final report by ARB staff recommended that a VOC exemption be granted for hydrofluoroether 7200 (HFE 7200). To the extent this compound is used to replace VOCs, providing an exemption will result in additional VOC emission reductions.

In developing the proposed amendments, staff reorganized survey categories based on similarities in product function or other criteria. Staff further developed the proposed VOC and GHG limits for product categories based on technical information provided by interested parties and staff's research efforts. Staff made some modifications to the original proposal after consideration and evaluation of comments.

C. ALTERNATIVES CONSIDERED

Government Code section 11346.2 requires ARB to consider and evaluate reasonable alternatives to the proposed regulation and provide reasons for rejecting those alternatives. Staff identified three alternative approaches to the current proposal: "No Action," "Set Different Limits," and "Set Limits for Different Categories."

Alternative One- No Action

A "No Action" alternative would be to forego adopting the proposed amendments, or delay adoption of the proposed measures. The "No Action" alternative would result in failing to make progress toward meeting our SIP commitment, and failing to make progress in reducing the use of high-GWP compounds in consumer products (See Chapter I. Introduction). In the case of not meeting the SIP commitments, there is a potential for loss of federal funds. The citizens of California would not benefit from the improved air quality that would result from the reduction of emissions being proposed. This alternative would have no cost on business.

Alternative Two – Set Different Limits

As was discussed in section B above, staff thoroughly evaluated each category for which a limit is proposed. Staff proposed limits based on low emitting technologies reported in the 2003 Survey. Stakeholders provided additional information pertinent to the categories and, in some cases, proposed alternative limits. Staff evaluated all comments and determined the most feasible limit from all of the alternatives proposed or considered. The final proposal contains limits that were determined to obtain the maximum feasible reduction, were commercially and technologically feasible, preserved product forms (as required by Health and Safety Code Section 41712), and together achieved the necessary emission reductions to partially fulfill ARB's SIP commitments and the Discrete Early Action Measures to reduce GHGs.

Alternative Three – Set Limits for Different Categories

Staff carefully reviewed the 2003 Survey data to select categories where reductions were feasible. Considering all available information, staff determined that at

this time, for certain categories, limits would not achieve significant reductions, or could not be set such that it could be demonstrated that the limits were commercially or technologically feasible without further investigation. Examples of categories where further investigation is needed include Air Fresheners, Nail Coatings, and Paint and Lacquer Thinners.

Related to GHG reductions, the Pressurized Gas Duster category presented the best opportunity for reductions. We have the best available data to set the proposed GWP limit for Pressurized Gas Dusters.

For this current action, staff is proposing new or lower VOC limits for multiple categories and a GWP limit for one category that would achieve the maximum feasible reductions, and partially fulfill ARB's commitments. It should be noted that ARB has already set VOC limits for 115 product categories, with 150 VOC limits, achieving a 50 percent reduction in VOC emissions from the regulated categories.

We also note that categories surveyed in the 2006 Consumer and Commercial Products Survey will be evaluated and additional opportunities for further reductions in VOCs and GHGs may be identified.

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III. STATUTORY REQUIREMENTS FOR EMISSION REDUCTIONS

In this Chapter, we describe State law requirements related to setting volatile organic compound (VOC) and Global Warming Potential (GWP) limits, and how our proposals meet these criteria. We also provide the information related to complying products and complying marketshares which indicate the limits are commercially and technologically feasible in the timeframes provided.

A. VOC REDUCTIONS

Health and Safety Code section 41712 gives ARB authority to control emissions from a very diverse number of products sold statewide to household and commercial consumers. By law, "Consumer Product" means a chemically formulated product used by household and institutional consumers, including, but not limited to, detergents; cleaning compounds; polishes; floor finishes; cosmetics; personal care products; home, lawn, and garden products; disinfectants; sanitizers; aerosol paints; and automotive specialty products; but does not include other paint products, furniture coatings, or architectural coatings.

Section 41712 requires the Board to adopt regulations to achieve the maximum feasible reduction in VOCs emitted by consumer products after making certain determinations. Prior to adoption, the Board must determine that adequate data exist to establish that the regulations are necessary to attain State and federal ambient air quality standards and the regulations are commercially and technologically feasible and necessary. Amendments to section 41712 in 1996 specified that regulations adopted by the Board cannot result in the elimination of a product form. Product form refers to the shape and structure of the product, such as liquid, solid, powder, gel, crystal, aerosol, or pump spray.

The Board must consider the effect that the limits or requirements proposed for health benefit products will have on the efficacy of those products in killing or inactivating agents of infectious diseases such as viruses, bacteria, and fungi. In this regard, the Board must consult with health professionals when developing VOC control measures for health benefit products.

The Board must also meet its obligations under the State Implementation Plan (SIP). ARB's SIP commitments are described in both the Executive Summary and in Chapter I.

Related to VOC reductions, Chapter IV describes why the proposed amendments are necessary to attain ambient air quality standards, and why the data are adequate to adopt the proposed limits. Our focus in this Chapter is related to our rationale of why the proposed VOC limits are commercially and technologically feasible. During the early development of consumer product regulations, ARB staff established guidelines in setting the limits to ensure that these statutory criteria were met. These guidelines and statutory criteria were followed in developing the proposed amendments.

Section C describes the terms “technologically feasible” and “commercially feasible,” as they relate to VOC reductions.

B. GHG REDUCTIONS

Assembly Bill 32 (AB 32) was signed into law in 2006. It is codified in Health and Safety Code section 38500 *et. seq.* These sections require ARB to develop regulations and consider market mechanisms that will ultimately reduce California’s greenhouse gas emissions equivalent to the 1990 levels by 2020. It requires ARB to identify a list of Early Action Greenhouse Gas Reduction Measures by June 30, 2007. A subset of these has been identified as Discrete Early Action Measures. These actions are to be adopted and legally enforceable (approved by Office of Administrative Law) by January 1, 2010. Reduction of compounds with high GWP that are used in consumer products is designated as one of the approved early actions.

In developing regulations to meet GHG reduction goals, in accordance with section 38562, certain criteria are to be met. Among other things, the regulations must be equitable, minimize costs, and maximize the benefits to California. The GHG regulations are also required to be technologically feasible and cost-effective. Section D describes the criteria to be met in developing GHG reductions.

C. TECHNOLOGICAL AND COMMERCIAL FEASIBILITY OF VOC LIMITS

The proposed VOC limits were set based on the lower VOC content technologies existing within a product category, or are based on low emitting technology transfer from other products. In doing this, staff made sure that the various product forms within each category would be preserved. For the majority of the categories proposed for regulation, there are products on the market which currently comply. Where there is low complying market share, lower emission technology exists that can provide a pathway for compliance.

1. Technologically Feasible

Health and Safety Code section 41712(b) requires that the Board adopt consumer product regulations that are “technologically feasible.” Technological feasibility is a different concept than “commercial feasibility,” and does not take into account the cost of reformulating a product. Staff believes that a proposed limit is technologically feasible if it meets at least one of the following criteria: (1) the limit is already being met by at least one product within the same category, or (2) the limit can reasonably be expected to be met in the time frame provided through additional development efforts.

In setting the proposed VOC limits, staff made an effort, wherever possible, to ensure that multiple reformulation technologies exist which would allow products to comply. Proposed limits were set at VOC levels that staff determined could be met without increased use of toxic air contaminants, GHGs, or ozone-depleting compounds.

General reformulation options include addition of water with co-solvents, development of emulsion products, use of low vapor pressure (LVP)-VOC solvents, use of non-VOC propellants, and use of exempt solvents.

2. Commercially Feasible

Health and Safety Code section 41712(b) also requires the Board to adopt consumer product regulations that are “commercially feasible.” The term “commercially feasible” is not defined in State law. In interpreting this term, the staff has utilized the reasoning employed by the United States Court of Appeals for the District of Columbia in interpreting the federal Clean Air Act. In the leading case of International Harvester Company v. Ruckelshaus, (D.C. Cir. 1973) 478 F. 2d 615, the Court held that the U. S. EPA could promulgate technology-forcing motor vehicle emission limits which might result in fewer models and a more limited choice of engine types for consumers, as long as the basic market demand for new passenger automobiles could be generally met.

Following this reasoning, staff has concluded that a regulation is “commercially feasible” as long as the “basic market demand” for a particular consumer product can be met. “Basic market demand” is the underlying need of consumers for a product to fulfill a basic, necessary function. This must be distinguished from consumer “preference,” which may be towards specific attributes of a particular product. A “preference” is the choice of consumers for a certain product or products based upon fragrance, cost, texture, etc.

By way of example, a consumer has a basic market demand for a glass cleaner to remove soils, grease, dirt or grime from their windows. Glass cleaners may be formulated with glycol ether solvents or with ammonia. Consumers may choose an ammoniated glass cleaner because they prefer the performance characteristics, or they may choose a non-ammoniated glass cleaner because they dislike the smell of ammonia. This distinction is not recognized by all parties. Some stakeholders have expressed the view that consumers do not have a “basic market demand” for a general class of products, but that consumers instead have a number of separate and distinct “basic market demands” for many specialty products with differing characteristics.

ARB staff believes the consumer “preference” interpretation of “basic market demand” is inconsistent with the reasoning from the International Harvester case. To adopt such a narrow interpretation would be inconsistent with the clearly expressed legislative intent that “...the State board shall adopt regulations to achieve the maximum feasible reduction in reactive organic compounds emitted by consumer products...” (Health and Safety Code section 41712(a)). In order to achieve emission reductions, manufacturers of high VOC products which perform the same basic function as lower VOC counterparts must reduce the VOCs in their products. It is expected that when a product formulation changes, some attributes of the product will also change. If ARB were to establish limits which accounted for every distinct feature of every product, then

each product would require a limit unto itself. Using this approach, it would be impossible to achieve the maximum feasible reduction in VOC emissions.

Every currently marketed product has some unique features that differentiate it from other products. Consumers who purchase a product have demonstrated a preference over other competing products. This distinction between “preference” and “basic market demand” was clearly made in the International Harvester case. In the International Harvester case, the court stated that the proposed emission limits would be feasible even though they may result in the unavailability of certain kinds of vehicles and engine types people preferred (e.g. fast “muscle” cars), as long as the basic market demand for passenger cars could be generally met. Applying this principle to consumer products, the proposed amendments allow the basic market demand to be met for each product category, even though it may no longer be possible to manufacture products with some specific attributes. ARB staff believes that this approach complies with Health and Safety Code section 41712.

D. REQUIREMENTS OF AB 32

AB 32 requires that ARB adopt regulations by January 1, 2010 to achieve the maximum technologically feasible and cost-effective reductions in GHGs. Among other things, the reductions must be real, permanent, quantifiable, verifiable, and enforceable. ARB is also required to adopt rules and regulations in an open, public process. In developing regulations to meet GHG reduction goals, in accordance with section 38562, certain criteria are to be met. These criteria are summarized here with our assessment as to why the proposed regulatory action meets them, or is not specifically applicable.

In this rulemaking, we are proposing to regulate the GHG content for one category, Pressurized Gas Dusters. These products are used to clean computer parts and other sensitive electronics. Below is a discussion of why we believe that this rulemaking meets the requirements of State law.

- 1. The State Board shall adopt rules and regulations in an open public process to achieve the maximum technologically feasible and cost-effective greenhouse gas emission reduction from sources or categories of sources.**

The proposal to reduce the potency of GHG emissions from Pressurized Gas Dusters was developed in consultation with affected parties in an open, public process through a public workshop and several individual consultation meetings. See Chapter II, Development of Proposed Amendments, for a description of the public process.

2. Design the regulations, including distribution of emissions allowances where appropriate, in a manner that is equitable, seeks to minimize costs and maximize the total benefits to California, and encourages early action to reduce greenhouse gas emissions.

The Pressurized Gas Dusters proposed limit was set to maximize emission reductions uniformly through out the State, while minimizing costs. All manufacturers of Pressurized Gas Dusters, intended for sale in California, are required to meet the specified emission limit. No manufacturer or retailer would be allowed to sell non-complying products in California, therefore no user anywhere in California should be able to purchase non-complying products. Reductions in the potency of emissions will track with sales of Pressurized Gas Dusters. Therefore, as Pressurized Gas Dusters are used throughout the State, reductions would occur throughout the State. Greater reductions will likely occur in population centers.

The cost-effectiveness (CE) of the proposed limit is about \$0.22 per metric ton of carbon dioxide equivalents. See Chapter VII, Economic Impacts, for the detailed description.

The emission limit yields the maximum technically feasible reduction in the potency of GHG. As set forth in Chapter VI, Description of Product Categories, Section B, Greenhouse Gas Categories, further reductions from this category were determined not to be technologically and commercially feasible.

Nothing in the regulation discourages early action to reduce GHG emissions. In fact, many manufacturers have reduced the potency of GHG emissions over the last ten years by reformulating products to contain compounds with lower GWP. We expect this trend to continue prior to the effective date of the proposed emission limit. In addition to setting an effective date for the GWP limit, we are limiting to one year, the time product manufactured before the effective date can be sold. Once the sell-through period is over, the old product must be removed from store shelves.

3. Ensure that activities undertaken to comply with the regulations do not disproportionately impact low-income communities.

Use of consumer products is ubiquitous; no disproportionate localized impacts are expected. Greater reductions would occur in population centers, where more people reside. Compliance with this proposal will not require manufacturing plant changes that could cause a localized emission impact. Therefore, residents living near a plant producing or using Pressurized Gas Dusters, whether low-income or not, would not be disproportionately impacted.

- 4. Ensure that entities that have voluntarily reduced their greenhouse gas emissions prior to the implementation of this section receive appropriate credit for early voluntary reductions.**

This requirement is not applicable to this proposed rulemaking.

- 5. Ensure that activities undertaken pursuant to the regulations complement, and do not interfere with, efforts to achieve and maintain federal and state ambient air quality standards and to reduce toxic air contaminant emissions.**

GHG limits from consumer products will be set only for categories where there would be no significant increase in the use of criteria pollutants or toxic air contaminants. For Pressurized Gas Dusters specifically, to prevent any possible increase in the emissions of criteria pollutants, a VOC limit of 1 percent by weight, including fragrance, is proposed. This VOC limit proposal will prevent manufacturers from replacing high GWP compounds with hydrocarbon propellants. While hydrocarbon propellants have low GWP, and would meet the GWP limit of 150, they contribute to the formation of ground-level ozone. In addition, a prohibition on the use of the toxic chlorinated compounds Methylene Chloride (MeCl) and Perchloroethylene (Perc) is proposed for Pressurized Gas Dusters. This prohibition will prevent manufacturers from using MeCl and Perc in Pressurized Gas Duster products. While unlikely, manufacturers could choose to use MeCl and/or Perc in Pressurized Gas Dusters because they are good solvents, have relatively low GWP, and are exempt as VOCs. The 1 percent VOC limit, and the prohibition of the use of MeCl and Perc, is consistent with the requirements under California Environmental Quality Act (CEQA). CEQA requires that adverse impacts from adopting regulations be mitigated. See Chapter VIII, Environmental Impacts, for a more detailed description.

- 6. Consider cost-effectiveness of these regulations.**

The CE of the proposed limit is about \$0.22 per metric ton of carbon dioxide equivalents. See Chapter VII, Economic Impacts, for the detailed description.

- 7. Consider overall societal benefits, including reductions in other air pollutants, diversification of energy sources, and other benefits to the economy, environment, and public health.**

The proposed emission limit for Pressurized Gas Dusters is not expected to cause any adverse impacts to society or the environment. California will benefit from the reduction of GHG emissions. As discussed in the response to criterion five above, the proposal will not cause an increase in VOC or toxic air contaminant emissions. See Chapter VIII, Environmental Impacts, for a detailed description. In addition, no increase in the solid waste stream is anticipated. Reformulated products will be at least as effective as non-complying products. Packaging and the number of cans used should not increase.

8. Minimize the administrative burden of implementing and complying with these regulations.

The administrative burden of complying with the proposed emission limit to manufacturers and marketers is minimal. Product reformulation will require replacing one propellant with another, and should be fairly straight-forward. The proposal has very few administrative requirements. Affected products would be required to include on the label or can a date, or date code, indicating date of manufacture. No recordkeeping or product registration would be required. However, certain Pressurized Gas Dusters products may need to modify their product labels. The proposed modified definition for Pressurized Gas Dusters includes an exemption for products that are labeled to be used “exclusively on energized equipment.” To qualify for the exemption from the GWP and VOC limits, the product label must contain specific language. For existing products used on energized equipment that do not contain the language, administrative and other costs may be incurred in changing the labels.

9. Minimize leakage.

Leakage is not expected as a result of the proposed emission limitation for Pressurized Gas Dusters. Leakage occurs when an emission limit set by the State causes manufacturing or other activities to be displaced outside of California. If leakage were to occur, emissions, jobs and other economic benefits to California would be lost. The emission benefits of the proposed limit track with sales of Pressurized Gas Dusters. In addition, the proposed emission limit for Pressurized Gas Dusters requires that all products manufactured for sale in California comply with the limit regardless of where they are manufactured. Therefore, there would not be a situation where a manufacturing plant inside the State would be at a competitive disadvantage compared to plants located outside of the State.

10. Consider the significance of the contribution of each source or category of sources to statewide emissions of greenhouse gases.

The projected reductions that will be achieved through implementation of the proposed limit are equivalent to reducing about 0.20 million metric tons of carbon dioxide equivalent per year. While this reduction may appear somewhat modest, when the reduction is considered in conjunction with anticipated future GHG reductions from consumer products, and current and future reductions from other categories, the total reductions could become quite significant. The consumer products category encompasses hundreds of categories. When each is considered alone they are relatively small emitters, but with regard to GHG emissions the aggregate emissions may become more important. This situation necessitates achieving relatively small reductions from a large number of categories to achieve significant overall reductions.

11. The greenhouse gas emission reductions achieved are real, permanent, quantifiable, verifiable, and enforceable by the state board.

The emissions and emission reductions for Pressurized Gas Dusters were calculated based on data submitted by manufacturers and marketers of the affected products. The data were submitted in accordance with State law and were certified by an officer of each company that submitted the data. The GHG emissions and reductions were calculated based on GWP values defined by the Intergovernmental Panel on Climate Change 1995: Second Assessment Report (IPCC, 1996). The Consumer Products Regulation specifies the date upon which the proposed emission limit would become effective and further specifies how the emission limit is to be enforced. Further, the regulation specifies the test methods used to determine if products comply with the applicable emission standards. Finally, the regulation requires that products subject to emission limits must be dated or date coded. The date of manufacture enables enforcement personnel to ascertain if a product is subject to the applicable emission limit, based on the limit effective date. Once the amendments to the Consumer Products Regulation are approved by the Office of Administrative Law, the proposed emission limit will become State law. Based on the above, upon the effective date of the proposed emission limit, the reductions become real, permanent, quantifiable, verifiable, and enforceable.

12. For regulations.... the reduction is in addition to any greenhouse gas emission reduction otherwise required by law or regulation, and any other greenhouse gas emission reduction that otherwise would occur.

While many manufacturers have shifted from HFC-134a to HFC-152a resulting in a reduction in emission potency, HFC-134a products remain on the market. Therefore, the emission reductions, realized by requiring that most of the remaining Pressurized Gas Dusters reformulate, are new and would not have occurred in the absence of the proposed limit. The proposed emission limit for Pressurized Gas Dusters is the first emission limitation affecting the product category. No other existing State, federal or other requirements, specific to products sold in California, affecting emissions of GHG from Pressurized Gas Dusters exist. We are aware of requirements affecting GHG emissions from Pressurized Gas Dusters products sold in the state of Wisconsin, but those requirements do not affect products sold in California.

13. If applicable, the greenhouse gas emission reduction occurs over the same time period and is equivalent in amount to any direct emission reduction required pursuant to this division.

This requirement is not specifically applicable to the proposed emission limit for Pressurized Gas Dusters. The emission limit for Pressurized Gas Dusters is in fact a direct emission limit. There are no proposals for any market based or other "flexibility-based" compliance options for the proposed emission limit.

14. The state board shall rely upon the best available economic and scientific information and its assessment of existing and projected technological capabilities when adopting the regulations required by the law.

ARB staff used the best available economic and scientific information available to develop the proposed emission limit for Pressurized Gas Dusters. The description in this Section B documents that the proposal was developed in accordance with AB 32 requirements. Chapter VII, Economic Impacts, contains a detailed description of the economic impact of the proposed emission limit. In addition, a rigorous technological assessment of Pressurized Gas Dusters was performed. See the detailed technical discussion in Chapter VI, Description of Product Categories, Section B, Categories for Which a Greenhouse Gas Limit is Proposed, Subsection 1, Pressurized Gas Duster.

E. COMPLIANCE WITH THE PROPOSED AMENDMENTS

Manufacturers of non-complying products will need to reformulate their products to meet the applicable VOC or GWP limits. Manufacturers have the flexibility to choose any formulation that meets the applicable limit and the reformulation options vary with each product category (see Chapter VI of the Technical Support Document). To comply with VOC limits, VOC solvents or propellants will need to be replaced, or partially replaced, with non-VOC ingredients. This may require switching to a water-based formulation, using acetone or another exempt solvent, increasing product solids, or formulating with a non-VOC propellant. Manufacturers may also need to change the valve, container, delivery system, or the other components of the consumer product depending on the individual formulation. ARB staff has proposed VOC limits that can be met without the increased use of toxic air contaminants.

To meet the GWP limit for Pressurized Gas Duster, manufacturers of non-complying products will need to substitute a lower GWP propellant for the currently used higher GWP propellant. We expect that manufacturers will substitute HFC-152a for HFC-134a. We are also proposing a VOC limit for Pressurized Gas Duster products to ensure that VOC emissions do not increase as products reformulate. Because HFC- 152a is an exempt VOC meeting a 1 percent VOC limit is very feasible.

Table III-1 summarizes, for the proposed VOC limits, data related to the complying market-shares (based on sales), as well as the number of products that currently comply relative to total number of products reported.

Manufacturers can also comply with the proposed amendments through the use of the Innovative Products Provision (IPP), or the Alternative Control Plan (ACP). The IPP allows manufacturers of “innovative products” to comply with the Consumer Products Regulation if they demonstrate through clear and convincing evidence that their product will result in less VOC emissions than a complying product that meets the

applicable VOC limit. The innovative product may result in less emissions due to some characteristic of the product formulation, design, delivery system, or other factors.

The ACP allows manufacturers to average the emissions from products above and below the applicable VOC limits, as long as the overall emissions are less than or equal to the emissions that would have occurred had all the products complied with the VOC limits. Manufacturers must submit an application which includes the VOC content of the products in the plan, a method of verifying the sales of each product in the plan, and other information necessary to track overall emissions.

Table III-1 shows that the complying marketshares (except where confidential) range from 3 to 100 percent. Generally, in those categories where the complying marketshare is low, more time is provided to comply with the limit.

Although not shown in Table III-1, 86 percent of reported products (based on sales) comply with the GWP limit for the Pressurized Gas Duster category. Moreover, 18 of 90 products currently comply with the GWP limit of 150. Based on these complying marketshares and the number of complying products, staff believes the proposed VOC and GHG limits are commercially and technologically feasible.

Table III-1
Summary of Complying Products and Complying Marketshares

Product Category		Product Form	Proposed VOC Limit (weight %)	Number of Complying Products/ Total	Complying Market Share (%)
Astringent / Toner (non-FDA regulated)		All	35	177 / 203	70
Carpet/Upholstery Cleaner		Aerosol	5	7 / 59	10
		Non-aerosol	1	54 / 117	25
Dusting Aid		Aerosol	17	13 / 41	5
		Non-aerosol	3	33 / 38	74
Fabric Protectant		Non-aerosol	1	42 / 63	95
Fabric Softener – Single Use Dryer Product		All	0.05 grams per use*	20 / 26	24
Floor Maintenance Product		All	1	57 / 98	53
Floor Polish or Wax – Wood Floor Wax		All	70	*** / 7	***
Glass Cleaner		Aerosol	10	32 / 95	37
Motor Vehicle Wash		All	0.2	311 / 366	89
Multi-purpose Lubricant – excluding solid & semisolid		All	25	38 / 176	4
		All	10	22 / 176	3
Odor Remover/Eliminator		Aerosol	25	*** / ***	100
		Non-aerosol	6	154 / 184	82
Penetrant		All	25	14 / 84	30
Personal Fragrance Product (products with 20% or less fragrance)		All	75**	679 / 1101	37
Pressurized Gas Duster		All	1	89 / 90	> 99
Sealant or Caulking Compound	Chemically Curing	Non-aerosol	3	95 / 196	23
	Non-Chemically Curing	Non-aerosol	1.5	201 / 344	76
Spot Remover		Aerosol	15	18 / 70	4
		Non-aerosol	3	231 / 261	94
Tire or Wheel Cleaner		Aerosol	8	*** / 8	***
		Non-aerosol	2	63 / 102	69
Windshield Water Repellant		All	75	*** / 30	***

Source: 2003 Consumer and Commercial Products Survey (ARB, 2004a) grown to 2008, and the 2007 Pressurized Gas Duster Survey Update

* Grams per use limit provides emissions reductions equivalent to 2.6 percent by weight VOC limit, including fragrance

** Remove “Grandfather” clauses

*** Omitted to protect confidentiality

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IV. EMISSIONS

California's extreme air quality problems require unique strategies for improving air quality and slowing climate change. In this Chapter, we provide an overview of criteria pollutant air quality and climate change problems, which are germane to the regulation of consumer products. We also describe the need for significant emission reductions from all sources contributing to these problems. This Chapter includes a description of the need for the regulation of consumer products and provides a summary of the emissions from the categories proposed for regulation. For a detailed summary of the product categories, the reader is referred to Chapter VI.

A. CRITERIA POLLUTANTS AND AMBIENT AIR QUALITY STANDARDS

Federal and state ambient air quality standards have been established to protect California's population from the harmful effects of ozone and particulate matter (PM). An ambient air quality standard sets legal limits on the level of an air pollutant in the outdoor (ambient) air necessary to protect public health. Both ARB and U.S. EPA are authorized to set standards.

Volatile organic compound (VOC) emissions from consumer products contribute to the formation of both ozone and fine PM. Other sources of VOCs include emissions from fuel combustion, coatings and paints. PM pollution is the result of both direct and indirect emissions. Direct sources of PM include emissions from fuel combustion and wind erosion of soil. Indirect PM emissions result from the chemical reaction of VOCs, nitrogen oxides (NO_x), sulfur oxides and other chemicals in the atmosphere.

1. Ozone

Ozone formation in the lower atmosphere results from a series of chemical reactions between VOCs and nitrogen oxides in the presence of sunlight. The rate of ozone generation is related closely to both the amount and reactivity of VOC emissions as well as the amount of NO_x emissions available in the atmosphere (Seinfeld and Pandis, 1998). Ozone is a colorless gas and the chief component of urban smog. It is one of the State's more persistent air quality problems. Ninety-three percent of Californians, or 36 million people, live in areas designated as non-attainment for the federal eight-hour ozone standard. California experienced 41 percent of the total national ozone exposure, based on analysis of population exposure conducted by ARB staff for the years 2000 through 2002 (ARB, 2006b). California occupies the top five spots and has six out of the top ten areas with the highest levels of ozone (2004 design values).

It has been well documented that ozone adversely affects respiratory function of humans and animals. Human health studies show that short-term exposure to ozone injures the lung (ARB, 2005, 2000a; U.S. EPA, 2006). In some animal studies, permanent structural changes with long-term exposures to ozone concentrations considerably above ambient were seen; these changes remain even after periods of

exposure to clean air (U.S. EPA, 2006). Exposure to levels of ozone above the current ambient air quality standard can lead to lung inflammation, lung tissue damage, and a reduction in the amount of air inhaled into the lungs.

Ozone is a strong irritant that can cause constriction of the muscle cells in the airways that result in symptoms such as coughing, chest tightness, shortness of breath, and increased asthma symptoms (ARB, 2005). Recent evidence suggests that ozone may be linked to the onset of new asthma in very active children (McConnell *et al.*, 2002). Ozone has also been associated with premature death. Based on 2001-03, premature deaths from ozone exposure in California are estimated at 630 (ARB, 2005). Ozone in sufficient doses can also increase the permeability of lung cells, rendering them more susceptible to toxins and microorganisms. Other health effects associated with ozone exposure include hospitalizations and school absences. Of course, the greatest risk from ozone exposure is to those who are active outdoors during smoggy periods, such as children, athletes, and outdoor workers.

Not only does ozone adversely affect human and animal health, but it also affects vegetation, throughout most of California, resulting in reduced yield and quality in agricultural crops, disfiguration or unsatisfactory growth in ornamental vegetation, and damage to native plants. During the summer, ozone levels are often highest in the urban centers in Southern California, the San Joaquin Valley, and Sacramento Valley, which are adjacent to the principal production areas in the State's multibillion-dollar agricultural industry (USDA, 2006). ARB studies indicate that ozone pollution damage to crops is estimated to cost agriculture over \$500 million dollars annually (ARB, 1987; ARB, 2006b).

2. Fine Particulate Matter

PM is a complex mixture of tiny particles that may consist of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, and dust. As described above, PM can be directly emitted from sources, such as diesel PM, or can be produced indirectly from sources which emit precursors that are converted to PM by atmospheric processes. Particles 10 micrometers or less in diameter are defined as "respirable particulate matter" or "PM₁₀." PM₁₀ and particles 2.5 micrometers or less in diameter (PM_{2.5}) can be inhaled deep into the lungs. PM_{2.5} contributes significantly to regional haze and reduction of visibility in California. Besides reducing visibility, the acidic portion of PM (nitrates, sulfates) can harm crops, forests, aquatic and other ecosystems (ARB, 2002).

Considerable epidemiologic research over the past 15 years has investigated the responses of humans to PM. The principal health effects of PM exposure are summarized below:

- Many studies have consistently found statistical associations between PM_{2.5} and premature death with both long-term (Pope *et al.*, 2004; Pope *et al.*, 2002;

Krewski *et al.*, 2000; Laden *et al.*, 2006) and daily exposures (e.g., Dominici *et al.*, 2005; Dominici *et al.*, 2003; Schwartz *et al.*, 2003; Laden *et al.*, 2000). The association with premature mortality is considerably stronger for annual average PM_{2.5} exposure than for daily average PM_{2.5}. That is, long-term exposure appears to pose a greater risk of death than short-term exposure.

- A recent study suggests that long-term exposure to PM_{2.5} may influence the risk of adverse cardiovascular events in women (Miller *et al.*, 2007), including hospitalization or death from heart attack or stroke.
- Daily exposure to PM_{2.5} has been associated with hospitalization for heart and lung related causes (Moolgavkar, 2003; Schwartz *et al.*, 2003; Zanobetti *et al.*, 2003). Others have found that exposure to PM_{2.5} resulted in increased emergency room visits; exacerbation of asthma, and other respiratory diseases (Peel *et al.*, 2005; Sheppard *et al.*, 2003). Other research indicates that exposure to PM_{2.5} leads to increased asthma medication usage (Gent *et al.*, 2003), and increased asthma symptoms (e.g., Delfino *et al.*, 2002; Whittemore and Korn, 1980). Exposure to PM_{2.5} has also been associated with increased work loss days (Ostro *et al.*, 1993; Ostro *et al.*, 1989).
- Older adults with pre-existing chronic heart or lung disease are at greatest risk of experiencing adverse effects related to PM_{2.5} exposure (Moolgavkar, 2003; Dominici *et al.*, 2006; Symons *et al.*, 2006).

There is some evidence suggesting that air pollution may have greater effects in children than in adults. This may be because they inhale more PM_{2.5} per pound of body weight than do adults, and because they breathe more rapidly than adults. Adverse effects reported in children include reduced lung function and growth in higher pollution areas (Gauderman *et al.*, 2004; Gauderman *et al.*, 2002; Gauderman *et al.*, 2000) that may at least partially reverse if the child moves to an area with cleaner air (Avol *et al.*, 2001); increased asthma and bronchitis symptoms (Gauderman *et al.*, 2005; *et al.*, 1999); increased school absenteeism (Gilliland *et al.*, 2001); and increased risk of acquiring asthma for children who engage in three or more outdoor sports and live in areas with high ozone concentrations (McConnell *et al.*, 2002).

3. Ambient Air Quality Standards

In April 2005, the Board reviewed California's one-hour peak standard for ozone and determined that it alone was not sufficiently protecting public health. Consequently, ARB adopted a new eight-hour ozone standard of 0.070 parts per million (ppm) averaged over eight hours, while retaining the existing one-hour ozone standard at 0.09 ppm. Regarding particulate matter, the Board adopted stricter standards in 2002, which include a PM₁₀ annual average standard of 20 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) and a new annual average PM_{2.5} standard of 12 $\mu\text{g}/\text{m}^3$. The State PM₁₀ standard for a 24-hour period remains at 50 $\mu\text{g}/\text{m}^3$. The national and State ambient air quality standards for ozone and PM are shown in Table IV-1.

Table IV-1
Ambient Air Quality Standards for Ozone, PM₁₀ and PM_{2.5}

Pollutant	Averaging Time	State Standard	National Standard
Ozone	1 hour	0.09 ppm (180 µg/m ³)	-----
	8 hour	0.070 ppm (137 µg/m ³)	0.075 ppm* (147 µg/m ³)
PM ₁₀	24 hour Annual Arithmetic Mean	50 µg/m ³ 20 µg/m ³	150 µg/m ³ -----
PM _{2.5}	24 hour Annual Arithmetic Mean	----- 12 µg/m ³	35 µg/m ³ 15 µg/m ³

Source: Air Resources Board, Ambient Air Quality Standards April 1, 2008 (ARB, 2008a).

* This standard became effective on March 12, 2008. The 2007 SIP demonstrates attainment with the previous standard of 0.08ppm.

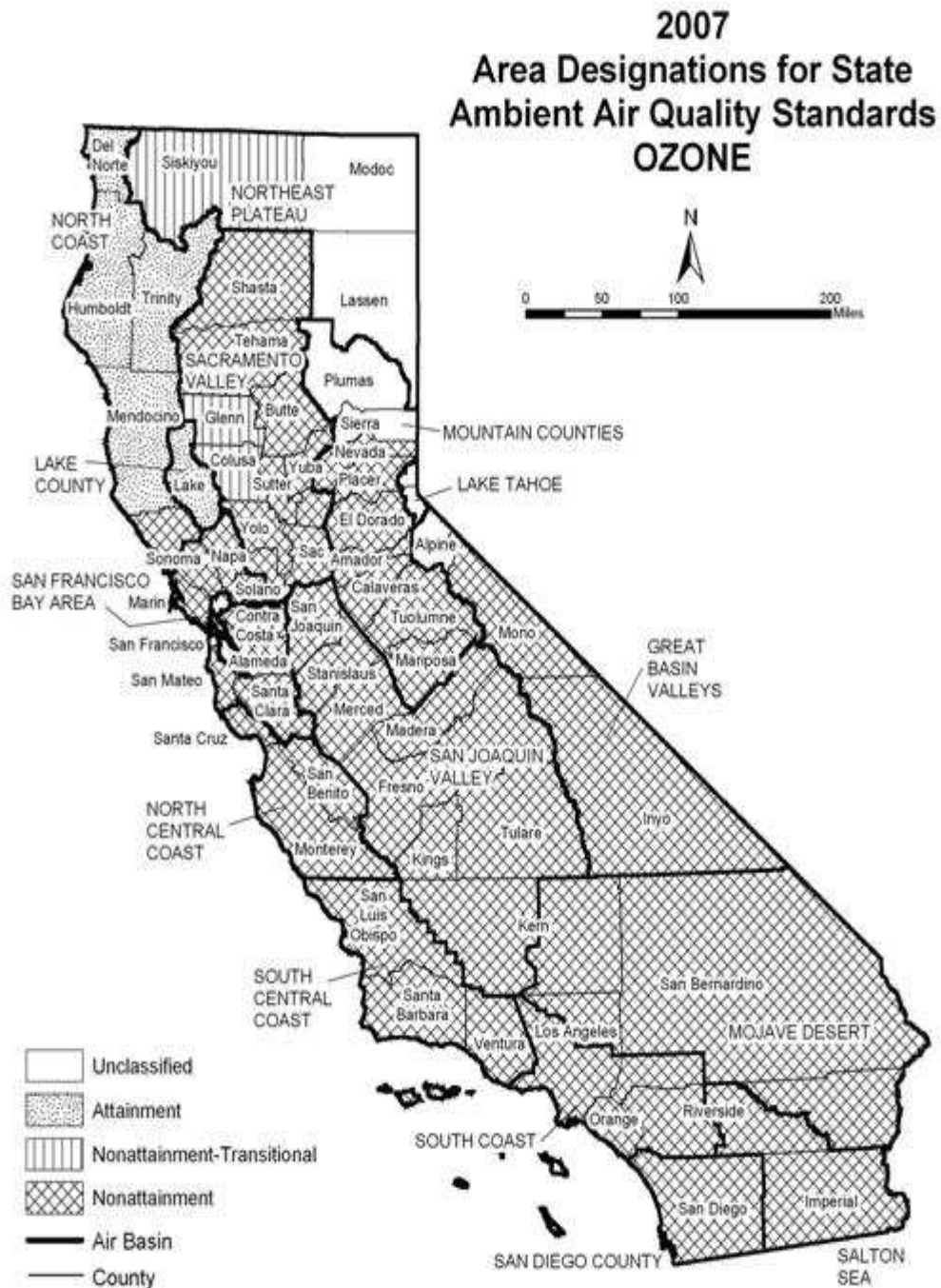
Table IV-1 reflects the newly revised national eight-hour standard for ozone of 0.075 ppm, which was promulgated on March 12, 2008. The U.S. EPA's rescission of its one-hour ozone standard is also reflected (U.S. EPA, 1997). Despite these revisions to the national standards, Table IV-1 clearly shows that California's standards for PM and ozone continue to be more health protective than those at the federal level.

4. Area Designations for California Ambient Air Ozone Standard.

The California Clean Air Act (CCAA) of 1988 has the fundamental goal that all areas of California are to attain the State ambient air quality standards for ozone by the earliest practicable date. As specified in the CCAA ARB has designated areas of California to be in "attainment" or "non-attainment" for the State ozone standards. For the year 2007, Figure IV-1 shows the counties designated as non-attainment (or non-attainment-transitional, which is a subcategory of non-attainment) for the State ozone standard. As shown, unhealthy levels of ozone are not limited to urban areas, but can be found in nearly every county in California. This map clearly indicates the extent and magnitude of the ozone problem in California.

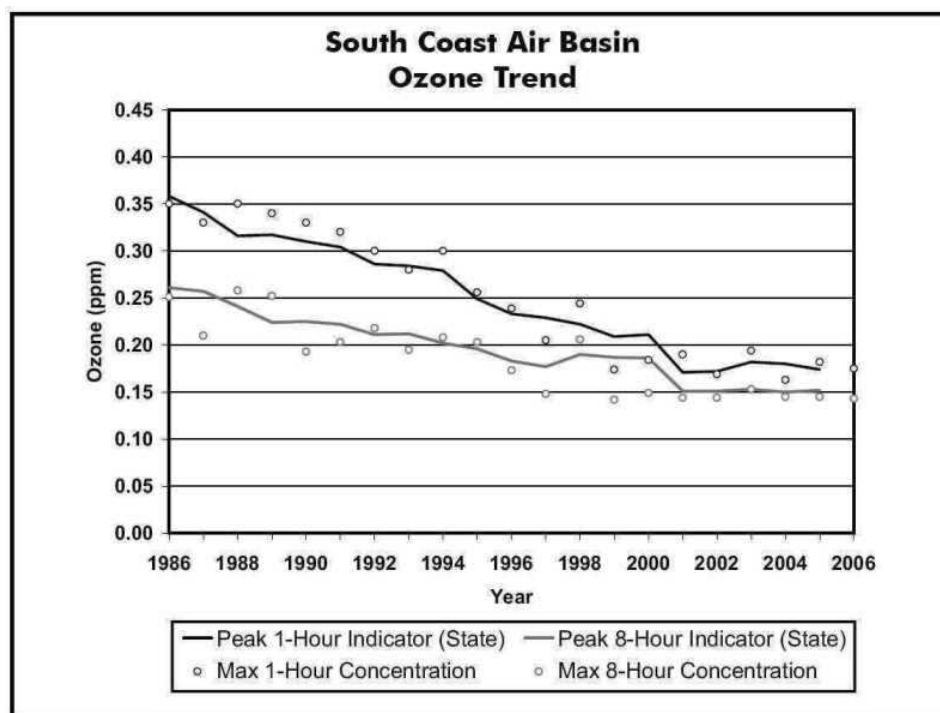
The areas that are non-attainment for the State ozone standards are also non-attainment for the previous 0.08 ppm federal eight-hour ozone standard. The federal non-attainment designations include a number of rural Sierra Nevada foothill counties and additional parts of the Sacramento Valley. The federal one-hour standard was revoked on June 15, 2005, one year after the effective date of the designations. SIPs showing how each non-attainment area will meet the 0.08 ppm eight-hour ozone standard were submitted in 2007. In order to maintain progress towards clean air, the federal Clean Air Act prohibits backsliding on the control program.

Figure IV-1



Recent air quality trends have shown that progress is being made towards achieving the State ozone standard. For the South Coast Air Basin all of the ozone statistics show an overall steady decline, as seen in Figure IV-2. The 2005 three-year average of the maximum eight-hour concentration is almost 41 percent lower than 1985. Also, the number of days above the standards has declined dramatically. The downward trend for both the eight-hour and one-hour ozone concentrations is similar (ARB, 2007g).

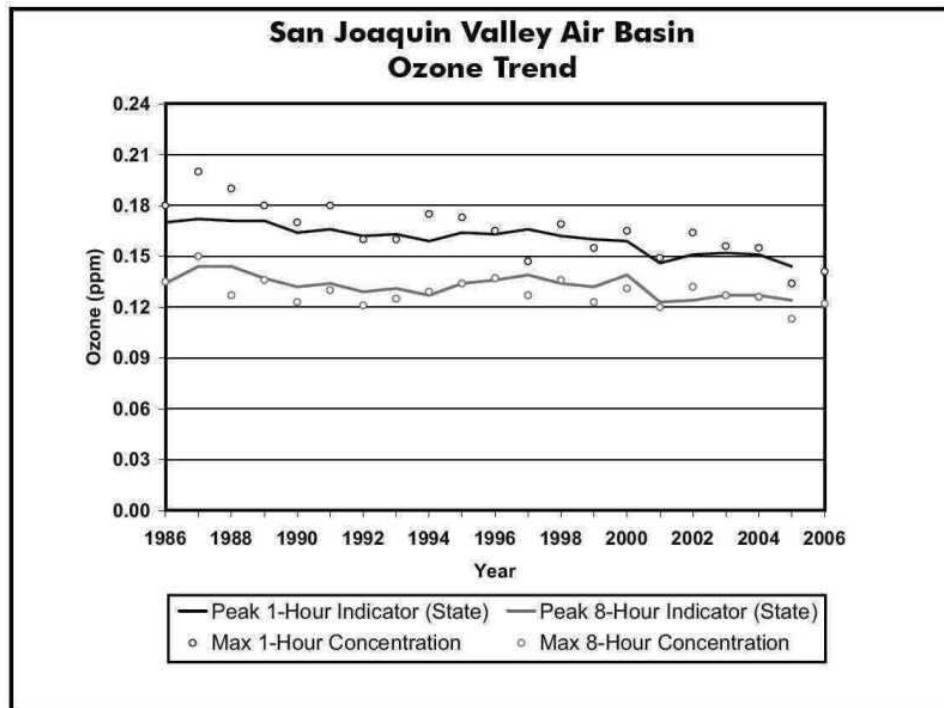
Figure IV-2
South Coast Air Basin Ozone Trend



Source: ARB 2007 Almanac

The ozone problem in the San Joaquin Valley ranks among the most severe in the State. Peak levels have not declined as much as the number of days that standards are exceeded. From 1985 to 2004, the maximum peak eight-hour indicator decreased only two percent. The number of national eight-hour standard exceedance days has been quite variable over the years. This variability is due, in part, to the influence of meteorology as well as changes to the monitoring network. The monitoring network was not as extensive during the 1980's as it has been during the last 14 years. For this reason, the period between 1990 to 2005 provides a better indication of trends. During this period, there has been an eight percent decrease in the three-year average of the number of exceedance days of the national eight-hour standard (ARB, 2007g). Figure IV-3 shows the ozone trend between years 1986 and 2006.

**Figure IV-3
San Joaquin Valley Air Basin Ozone Trend**



Source: ARB 2007 Almanac

Despite over 25 years of regulatory efforts and the decline of smog levels in areas such as the South Coast Air Basin and the San Joaquin Air Basin, ozone continues to be an important environmental and health concern in California and more emission reductions are necessary. The State Strategy for California's 2007 State Implementation Plan addresses the State measures necessary to meet the previous national ozone standard of 0.08 ppm averaged over eight hours.

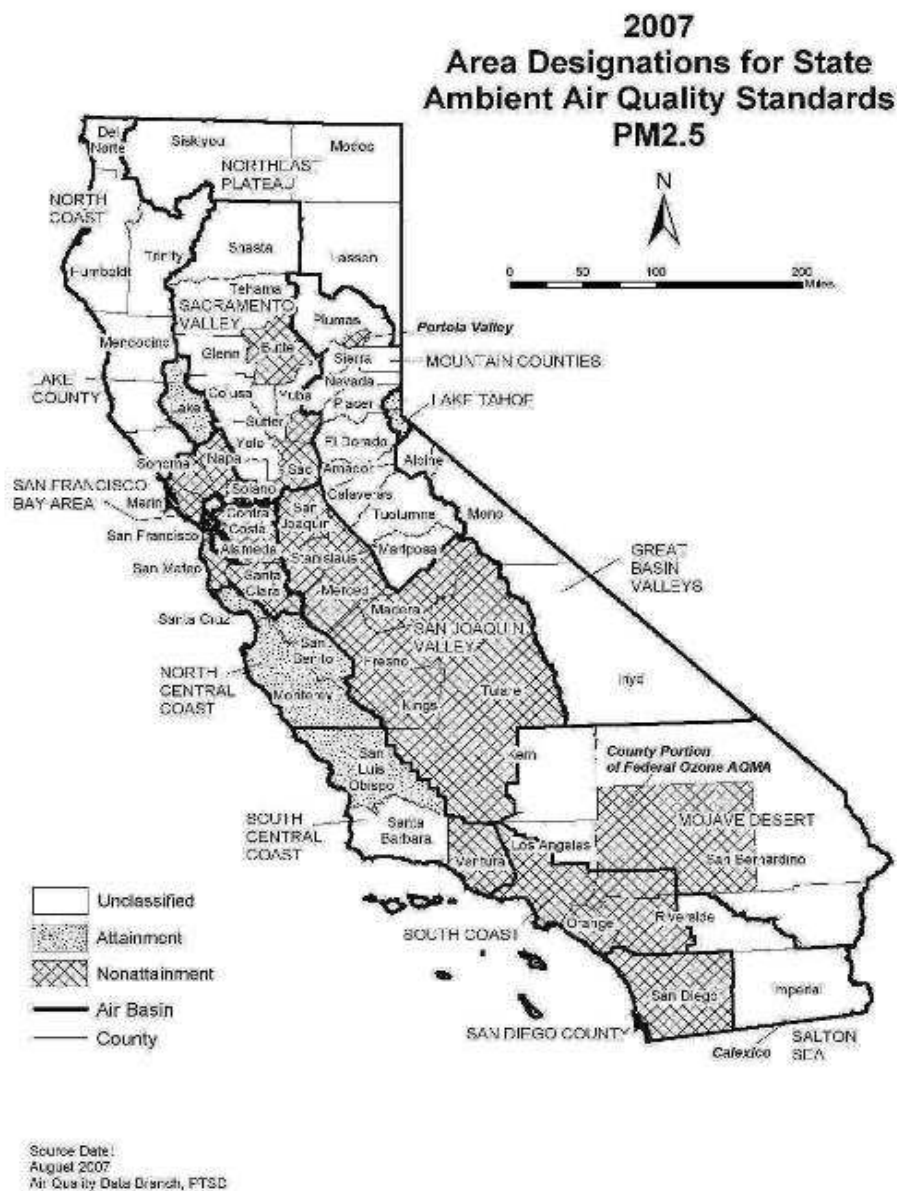
5. Area Designations for California Ambient Air PM_{2.5} Standard

Figure IV-4 shows the counties designated as non-attainment for the State PM_{2.5} standard. As with ozone, unhealthy levels of PM_{2.5} are not limited to urban areas, but can be found in many counties throughout California.

Related to the federal PM_{2.5} standard, in December 2007, ARB submitted non-attainment area recommendations and appropriate boundaries to U.S. EPA, in response to the new federal 24-hour PM_{2.5} standard of 35 µg/m³ established on December 18, 2006. The non-attainment area recommendations are based on 2004-2006 PM_{2.5} air quality monitoring data. ARB recommended that the South Coast Air Quality Management District (SCAQMD), the San Joaquin Valley Air Pollution Control District (SJVAPCD), the Bay Area Air Quality Management District, the Sacramento Air Quality Management District, the combined cities of Yuba City/Marysville, the city of Chico, and the city of Calexico be designated as non-

attainment for the new 24-hour $PM_{2.5}$ standard. Thus, most of the areas shown in Figure IV-4 are also non-attainment for the federal 24-hour $PM_{2.5}$ standard. The SCAQMD SIP was approved by the Board in September, 2007 and it was submitted to U.S. EPA in November, 2007. The $PM_{2.5}$ SIP for SJVAPCD is expected to be considered at the May Board meeting.

Figure IV-4



B. THE CALIFORNIA GLOBAL WARMING SOLUTIONS ACT OF 2006

Scientists have concluded that the evidence is overwhelming that the planet is warming from the higher concentration of greenhouse gases in the atmosphere. Although greenhouse gases (GHG) are naturally occurring, the steep increase in these heat-trapping gases since the Industrial Revolution leaves very little doubt that human activity is to blame for these recent climate change trends. The fact that GHGs remain in the atmosphere for a very long time, and that man-made emissions of GHGs are continuing to increase, mean that the world will continue to warm in the centuries ahead. This warming, or climate change, is a global problem. Clearly, no single state or country can single-handedly solve the problem. However, California is stepping forward to do its part. To address the problem, Assembly Bill 32, the California Global Warming Solutions Act of 2006 (AB 32), was signed into law by the Governor in September 2006. By enacting this Legislation, the legislature declared:

“Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.”

This legislation is codified in the California Health and Safety Code, commencing with section 38500. Beyond the AB 32 requirements the Governor’s Executive Order EO-S-03-05 calls for an additional 80 percent reduction in GHG emissions by 2050.

While carbon dioxide (CO₂) is the GHG emitted in the largest quantity, other GHGs include, but are not limited to, methane, nitrous oxide, and hydrofluorocarbons (HFCs). Related to the role of consumer products, HFCs are the primary source of GHG emissions. To a lesser extent hydrochlorofluorocarbons (HCFC) and hydrofluoroethers (HFE) play a role.

1. Climate Change

Climate change, or global warming, is the process whereby emissions of anthropogenic pollutants, together with other naturally-occurring gases, absorb infrared radiation in the atmosphere, leading to increases in the overall average global temperature. The standard definition of “greenhouse gas” includes, but is not limited to, six substances as identified in the Kyoto Protocol; carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), HFCs, perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). Changes in the atmospheric abundance of GHGs alter the energy balance of the climate system. These changes are expressed in terms of radiative forcing. While CO₂ is the largest contributor to radiative forcing, methane, halocarbon, N₂O, and other species also contribute to climate change.

Controlling multiple substances that jointly contribute to climate warming requires some method to compare the effects of the different gases because the physical properties (climate warming impact and persistence in the atmosphere) of the GHGs are very different. The current solution to this problem is the calculation made by the Intergovernmental Panel on Climate Change (IPCC), known as Global Warming Potentials (GWP) (IPCC, 2007; IPCC, 1996). The basic idea is to calculate the cumulative climate warming over a specified time span resulting from one unit mass of the GHG emitted. The estimates of GWPs have extensively been reviewed by many climate scientists around the world. The IPCC is constantly evaluating GWP values and the assessment is generally updated every 6 years.

By convention, the GWP index is defined relative to CO₂ which has a GWP of 1. The Second Assessment Report (SAR) (IPCC, 1996), defines the GWP of a GHG as the ratio of the time-integrated radiative forcing impact from an instantaneous release of 1 kilogram (kg) of a trace substance relative to that of 1 kg of CO₂. The standard units of measurement used to express the emissions of a GHG is, million metric tons of CO₂ equivalents (MMT CO₂e) per year.

The GWP values used by ARB are generally the 1996 SAR GWP values (ARB, 2007c). These values are used when converting emissions of GHGs to carbon dioxide equivalent values (CO₂e). The SAR GWP values are used to be consistent with the Board's Discrete Early Action Report, other statewide and national GHG inventories, and the upcoming Scoping Plan.

The climate warming impact from emissions of GHGs is the product of two factors: (1) the mass of GHG emitted, and (2) its warming potential. In addition to uncertainty in the mass of emissions, there is also uncertainty in attributes of warming potential (as a function of direct and indirect warming impacts and the atmospheric lifetime) and thus in the assessment of GWP.

The GWP of a compound may reflect a direct effect as well as an indirect effect on global warming. The direct effect is the warming due to the absorption of radiation by molecules of the compound in question. VOCs, CO₂, and HFCs all have direct effects. The indirect effect is due to the impact that the presence of the compound has on the concentration of other GHGs. For example, VOCs contribute indirectly to global warming, because they react chemically in the atmosphere to increase greenhouse gas concentrations of ozone and methane. While VOCs do have direct effects, they are considered GHGs primarily because of their role in creating ozone, and in prolonging the life of methane in the atmosphere. For consumer products, as mentioned earlier, direct emissions of HFCs are the primary concern. HCFCs, HFEs, CO₂, and N₂O are also compounds of interest.

2. Predicted Climate Change Impacts

Global average temperatures have risen both on land and in the oceans, with observable impacts already occurring. Scientists predict that if the increase in GHG emissions continues unabated, temperatures will rise by as much as 10 degrees Fahrenheit by the end of this century (Pew, 2006). It is impossible to predict exactly how climate change will affect California's ecosystems and economy in the future. However, the expected physical changes will impact California's public health, economy and ecology. There are many areas of concern.

One area of considerable concern is the effect of climate change on California's water supply. During the winter, in our mountains, snow accumulates in a deep pack, preserving much of California's water supply. If winter temperatures are warmer however, more precipitation will fall as rain, decreasing the size of the snowpack. Heavier rainfall in the winter could bring increased flooding. Less spring runoff from a smaller snowpack will reduce the amount of water available for hydroelectric power production and agricultural irrigation. Evidence of this problem already exists. Throughout the 20th century, annual April to July spring runoff in the Sierra Nevada has been decreasing, with water runoff declining by about ten percent over the last 100 years.

Another predicted outcome of climate change is a rise in sea level. California has already experienced a 3 to 8 inch rise in the last century. If the trend continues, large populations living along California's coast will face serious consequences such as flooding of low-lying property, loss of coastal wetlands, erosion of cliffs and beaches, saltwater contamination of drinking water, and damage to roads and bridges.

Air quality will also be exacerbated by increasing temperatures. Higher temperatures, strong sunlight, and stable air masses could lead to increased concentrations of ground-level ozone.

Climate change could impact California agriculture by increasing demand for irrigation to meet higher evaporative demand, while supply will become less reliable due to declining snowpack in the mountains. Climate change will also put our forests at greater risk for fire and disease (ARB, 2003).

3. Discrete Early Action Plan and Scoping Plan

Among other things, AB 32 requires ARB to design and adopt an overall Scoping Plan, by January 1, 2009, that identifies how GHG emissions can be reduced back to 1990 levels by 2020. AB 32 additionally recognizes that immediate progress in reducing GHG emissions can and should be made. Accordingly, AB 32 required ARB to identify a list of "discrete early action GHG reduction measures" by June 30, 2007. Discrete Early Actions are Board adopted regulations to reduce GHG emissions which are legally effective by January 1, 2010. These measures are to become part of the State's comprehensive strategy for achieving GHG reductions.

In June 2007, the ARB approved a list of early action GHG reduction measures. Additions to the list were approved by the Board at its October 2007 hearing. A subset of these early action measures was identified as discrete early action measures. One of the approved Discrete Early Action Measures designated in the Early Action Report calls for the reduction in use of compounds with high GWP in consumer products. The measure is estimated to achieve an emission reduction of 0.25 MMT CO₂e per year from consumer products (ARB, 2007b).

The objective of the consumer products Discrete Early Action measure is to reduce the impact of compounds with high GWPs when alternatives are available. Consumer product formulations may be required to reduce or eliminate the use of GHGs with high GWPs. The primary compounds of interest are HFCs. These compounds have direct impacts on global warming. As mentioned previously, VOCs have an indirect effect on increasing temperatures, in that they participate in reactions leading to the formation of ground level ozone. Therefore, our VOC reduction strategies for consumer products will also reduce the impact of consumer products' emissions on climate change.

The reduction in use of compounds with high GWPs in consumer products is a long-term effort. We are continuing to develop an emission inventory. Thus, we are unable to quantify what the overall total GWP emission reduction will be at this time. As we move forward, evaluate product categories, and identify areas where emission reductions are possible, we will quantify additional emission reductions as GWP limits are adopted. However, we expect to achieve the estimated reduction of 0.25 MMT CO₂e per year through this and subsequent rulemakings.

In this rulemaking, we are making our initial proposal to reduce GHGs in consumer products. We are proposing a GWP limit for Pressurized Gas Duster products. If adopted by ARB, this will be the first GWP standard in place for consumer products in California. ARB staff estimates the reduction from this measure to be equivalent to reducing 0.20 MMT CO₂ per year.

C. IMPORTANCE OF REGULATING CONSUMER PRODUCTS

As described in Section A and Section B of this Chapter, consumer products emissions contribute to the formation of ground level ozone, PM_{2.5}, and climate change. In this section, we provide information on the importance of regulating these emissions.

1. VOC Emissions

Consumer products are a significant source of VOC emissions in California. This section focuses on reducing emissions from consumer products as a ground-level ozone control strategy. Although each consumer product may seem to be a small source of emissions, the cumulative use of these products by over 37 million Californians results in significant emissions (CA DOF, 2007). Given the severity of the

air pollution problems in California further dramatic emission reductions from all sources contributing to ground-level ozone are necessary.

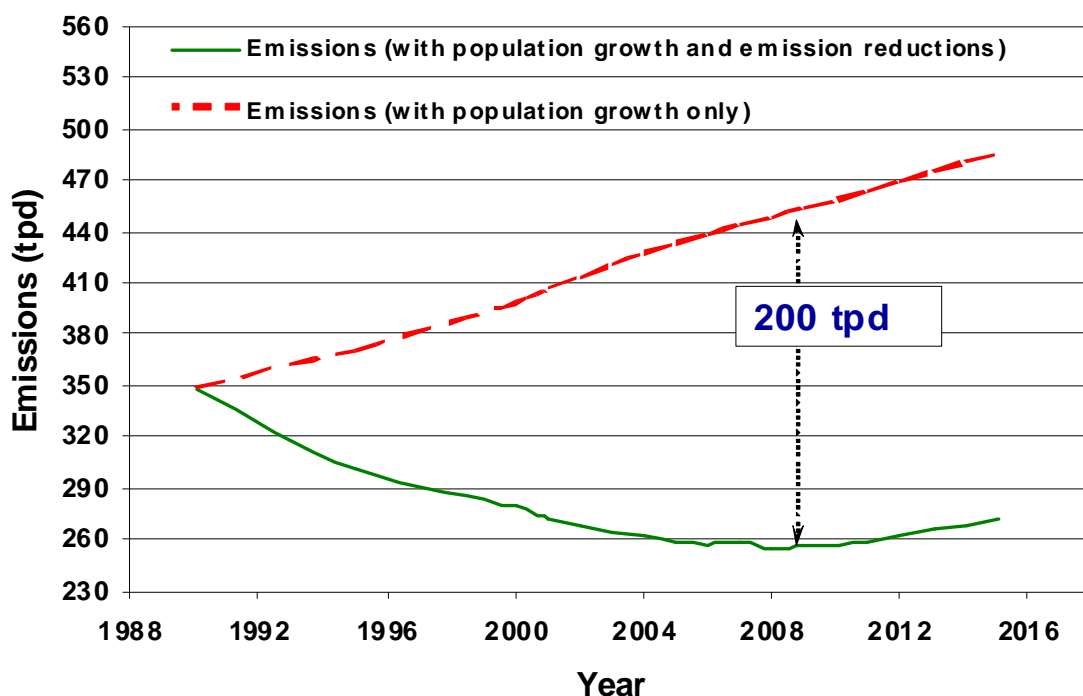
As evidence of the magnitude of consumer product VOC emissions, it is estimated that in 2010 consumer products emissions will be approximately 243 tons per day, or about 12 percent of the overall VOC inventory. In this same year, consumer product emissions will comprise about 18 and 7 percent of VOC emissions in the SCAQMD and SJVAPCD, respectively. Without further actions, consumer product emissions are expected to grow to approximately 270 tons per day in 2020, representing 14 percent of statewide VOC emissions. (ARB, 2007h).

As control measures for other VOC sources (i.e. mobile sources) become effective, consumer product emissions become more important in the SCAQMD. In fact, it is estimated that emissions from consumer products will be the number one source of VOC emissions in the South Coast AQMD in 2020. However, using the maximum incremental reactivity (MIR) scale (see title 17, CCR section 94700-94701) as the basis for comparison, consumer product emissions are over two times less reactive than are emissions from on-road motor vehicles. Regardless of the ozone-forming potential of various source categories, clearly, further reductions in VOC emissions from consumer products and other VOC sources are needed, if ozone attainment is to be achieved and maintained.

Despite these projections, ARB's consumer products program is a success story. Since 1989, regulations adopted by the ARB, along with numerous amendments to the regulations, have significantly reduced VOC emissions from consumer products. Absent these regulations today, consumer product emissions would likely be over 440 tons per day. Figure IV-5 shows that statewide consumer product VOC emissions have been reduced by over 200 tons per day in 2010. However, Figure IV-5 also shows that without further actions population growth would likely reverse the trend.

The emission values in Figure IV-5 are derived from several data sources. The 1990 to 2006 emissions are taken from the ARB Forecasted Emissions by Summary Category, 2007 Almanac (ARB 2007h). Emissions are then grown in proportion to population increase. Population growth is in accordance with estimates in the California Environmental Protection Agency's (Cal/EPA) Statewide Human Population Table found in the Population and Vehicle Trends Report (ARB, 2008d). For categories regulated in the 2006 Consumer Products Amendments, emission values from the 2003 Survey and the projected emissions reductions resulting from the VOC limits approved in 2006, are reflected in Figure IV-5.

**Figure IV-5
Consumer Products VOC Emission Trends**



As shown in Figure IV-5, the important emission reductions that have been realized from the ARB's Consumer Products Program are beginning to be partially offset by population growth. California's population is expected to grow to 40 million by 2010 (CA DOF, 2007). Therefore, ARB must continue its commitment to pursue additional technologically and commercially feasible reductions in consumer products emissions.

In 1988, with the passing of the California Clean Air Act (CCAA), the importance of controlling emissions from consumer products was set forth. To meet California ambient air quality standards the CCAA added section 41712 to the Health and Safety Code. This section requires that ARB adopt regulations to achieve the maximum feasible reduction in VOCs emitted by consumer products. As part of the regulatory process, ARB must determine that adequate data exist to adopt the regulations. ARB must also determine that the regulations are technologically and commercially feasible, necessary, and do not eliminate any product form.

To meet the federal standards, in 1994 emission reductions from consumer products became part of the California State Implementation Plan (SIP) for ozone. In this SIP, consumer products measures were put in place to work towards attaining the federal one-hour ambient air quality standard for ozone. In 2003, ARB again reiterated the commitment to reduce consumer products VOC emissions to meet the one-hour federal ozone standard.

In response to these mandates, three regulations with 150 VOC limits for 115 categories of consumer products (including antiperspirants and deodorants and 36 aerosol coatings categories) have been established to date. The adopted limits will achieve a 44 percent reduction in overall VOC emissions from consumer products by the year 2010.

In 2007, a new SIP was adopted. This State Strategy for California's 2007 State Implementation Plan (Strategy) includes California's plan to attain the national ozone standard of 0.08 ppm averaged over eight hours. The consumer products commitment in this strategy supplements the 1994 and 2003 commitments. In the Strategy, ARB has committed to an additional 30 to 40 ton per day VOC reduction from consumer products by 2014. As planned, rulemakings are to occur between 2007 and 2008 with reductions occurring in the 2010 to 2012 timeframe. Further rulemakings between 2010 and 2012, with implementation dates between 2012 to 2014, are to complete the emission reduction commitment (ARB, 2007d). This will continue ARB's commitment to reduce VOC emissions from consumer products. As previously mentioned, consumer products are expected to become the largest source of VOC emissions in the South Coast Air Basin, and the third largest source in the San Joaquin Valley Air Basin by 2020.

The Strategy also acknowledges that VOC reductions from consumer products are becoming more difficult to achieve. In light of this, the Strategy includes a commitment to explore innovative reduction strategies in the longer term. These measures would include investigating emission reduction opportunities through reactivity-based standards and alternative market-based mechanisms. If these mechanisms cannot produce meaningful emission reductions from the consumer products source category, then other approaches would be evaluated. Some of these approaches include the purchase of VOC credits; and funding of special projects to reduce emissions or accelerate reductions from pollution sources outside of the consumer products industry.

Because significant further VOC reductions are necessary to attain the federal ozone standard, the reductions from the amendments proposed in this report are therefore "necessary" within the meaning of section 41712 of the Health and Safety Code. In addition, section 41712(b)(1) of the Health and Safety Code provides that a regulation's "necessity" is to be evaluated in terms of both the State and federal standards.

The applicable State and federal laws show that both the U.S. Congress and the California Legislature intended progress toward clean air to be made as quickly as possible. The CCAA specifically declares that it is the intent of the Legislature that the State air quality standards be achieved "...by the earliest practicable date..." (See Health and Safety Code, sections 40910 and 40913(a); see also the uncoded section 1(b)(2) of the Act (Stats. 1988, Chapter 1568)). A similar intent is expressed in the federal Clean Air Act, which declares that the federal air quality standards are to be achieved "...as expeditiously as practicable..." (See sections 172(a)(2), 181(a), and 188(c) of the

federal Clean Air Act). For all of the reasons described above, the proposed amendments are “necessary” within the meaning of section 41712 of the Health and Safety Code.

The amendments proposed in this rulemaking are intended to partially fulfill the 2007 Strategy commitment for VOC reductions from consumer products.

2. Greenhouse Gas Emissions

We acknowledge that the GHG contribution of consumer products is modest relative to other sources, such as vehicle exhaust. However, the severity of the problem requires reductions from any source where it is feasible. While staff is still in the process of developing the consumer product GHG inventory, we do know from past surveys that several GHGs are used in consumer products.

Consumer products use various GHGs, mostly as propellants. To a much lesser degree, several solvents with fairly high GWPs are used. These compounds are typically low photochemically reactive compounds that are non-VOCs and have been used as a reformulation strategy to reduce VOC content. Compounds of interest include HFCs, HCFCs, HFEs, CO₂, and N₂O. However, the propellants HFC-134a and HFC-152a are the predominate GHGs used in consumer products today. In instances where flammability is a concern, HFC-134a is used. HFC-134a is a non-flammable propellant, whereas HFC-152a is minimally flammable. Compressed CO₂ is also used as a propellant, but the GHG emissions are negligible compared to the emissions from HFCs. Table IV-2 shows some examples of GHGs that are used in consumer products.

Table IV-2
Global Warming Potential of Selected Compounds used in Consumer Products

Compound	SAR GWP*	FAR GWP**
CO ₂	1	1
HFE-7200	N/A	59
HFC-152a	140	124
HCFC-141b	N/A	725
HFC-134a	1300	1430
HFC-43 10mee	1300	1640

* 100 year timeframe, SAR value

** 100 year timeframe, FAR value

As shown in Table IV-2, HFC-152a has a GWP of 140, while HFC-134a has a GWP of 1300. The value for HFC-134a is approximately ten times greater than the GWP of HFC-152a and 1300 times greater than CO₂. Reductions of HFC-134a are being pursued in this rulemaking.

GHG emissions data are available from the 2003 Survey of consumer products. Staff has evaluated these data for possible GHG reductions and development of new regulations for this rulemaking. Additionally, in the 2006 Survey, we surveyed manufacturers of consumer products to determine the usage of compounds with high

GWP in several more categories of consumer products (ARB, 2007f). Staff will use the 2006 survey data to develop the GHG inventory for consumer products, and evaluate the data for product categories where compounds with high GWP are used to determine if there is a potential to reduce them without increasing the use of VOCs.

Because reductions are necessary to slow climate change, the reductions from the amendments proposed in this report are necessary. The California Global Warming Solutions Act of 2006, by specifying adoption of Discrete Early Action Measures in Health and Safety Code section 38560, shows that the California Legislature intended progress toward reducing GHGs be made as quickly as possible. Because GHG reductions from consumer products have been designated as a Discrete Early Action Measure, to comply with State law, the proposed amendment to reduce the use of compounds with high GWP is necessary.

D. ESTIMATED EMISSIONS FROM CATEGORIES PROPOSED TO BE REGULATED

1. 2003 Consumer and Commercial Products Survey

The 2003 Consumer and Commercial Products Survey (2003 Survey) was mailed to over 5,000 companies in November 2004 (Appendix D). Data received from the 2003 Survey formed the basis for the emissions used in this rulemaking. A complete discussion of the extensive survey process is found in Chapter IV of "The Proposed Amendments to the California Consumer Products Regulation and the Aerosol Coatings Regulation" released on September 29, 2006 (the 2006 Amendments).

In summary, the 2003 Survey provided staff with detailed information on the formulations of consumer products, including complete speciation of VOCs, low vapor pressure VOC (LVP-VOC) solvents, and key exempt ingredients (ARB, 2004a). Total volumes of inorganic and other compounds were also provided. Information on sales, product form, customer types, and company size and economics were also requested.

ARB provided extensive summaries to industry detailing the aggregate sales, VOC speciation, VOC tonnage, and other key information. Summary tables were also provided (certain specific data were omitted to protect confidential information) detailing VOC content, product form, LVP-VOC content, and other information. The results of the 2003 Survey were discussed at workgroup meetings, and input from industry was used to correct inaccuracies in the data. For this rulemaking, the 2008 emissions and reduction estimates in the years when the limits become effective (2010-2015) were grown from 2003 sales data and the State Department of Finance's population estimates. Annual population growth factors were calculated using the 2008 State population figures and the California Environmental Protection Agency's (Cal/EPA) Statewide Human Population Table found in the Population and Vehicle Trends Report (ARB, 2008d).

Staff is confident that the 2003 Survey had adequate representation of the available technologies in the market place and finds that the data meet the requirement in Health and Safety Code section 41712(b) to base regulations on “adequate data.” This assumption has been verified by discussions with manufacturers, category research and the wide range of VOC content reported for products in the categories slated for regulation. The Pressurized Gas Duster Survey update, conducted in early 2008 for 2007 sales, also provided the best data for use in GHG proposal (ARB, 2008c).

In developing these proposals, staff worked extensively with stakeholders on each category proposed for regulation. In meetings with members of industry and other interested stakeholders, extensive discussions on the types of technologies used in each category were discussed. Numerous product labels and associated literature for each category were analyzed. Category information was also obtained from trade journals, Internet sites, textbooks, patents, and directly from manufacturers.

2. Emission Estimates for Categories

The total emissions from the categories proposed for regulation are estimated to be about 22.6 tons per day in 2008. Table IV-3 summarizes these emissions, as well as the anticipated VOC reduction when the proposed limits become effective.

If adopted, once all limits become effective, the VOC emission reductions will be approximately 5.8 tons per day.

3. Greenhouse Gas Emissions

Development of the proposed amendment to reduce the use of compounds with high GWP began with the GHG emissions data available from the 2003 Survey of consumer products. Staff evaluated these data for possible GHG reductions and development of new regulations for this rulemaking.

Based on these data it appeared that a GWP limit for Pressurized Gas Dusters was feasible. During the public process of developing the proposed GWP limit, staff held meetings and teleconferences to solicit information and comments from industry associations and industry representatives. At this time, industry representatives alerted ARB staff that significant changes in the gas duster market had occurred since 2003. In response, staff conducted the Pressurized Gas Duster Survey Update to collect updated data (ARB, 2008c). The GHG emissions from the Pressurized Gas Dusters for 2003 and 2007 were estimated using reported information from the 2003 Consumer Products Survey and from the Pressurized Gas Duster Survey Update gathered during February 2008 for 2007 sales. Information from both surveys is shown in Table IV-4.

Table IV-3
Proposed VOC Limits, Emissions, and Reductions at Effective Date

Product Category		Product Form	Proposed VOC Limit (percent by weight)	2008 VOC Emissions* (tons per day)	Reductions at Effective Date (tons per day)
Astringent / Toner (non-FDA regulated) ^a		All	35	0.62	0.11
Carpet/Upholstery Cleaner ^a		Aerosol	5	0.32	0.07
		Non-aerosol	1	0.29	0.07
Dusting Aid ^a		Aerosol	17	0.27	0.08
		Non-aerosol	3	0.01	0.00
Fabric Protectant ^a		Non-aerosol	1	0.18	0.08
Fabric Softener – Single Use Dryer Product ^a		All	0.05 grams per use**	0.52	0.21
Floor Maintenance Product ^a		All	1	0.11	0.07
Floor Polish or Wax – Wood Floor Wax ^a		All	70	0.06	0.01
Glass Cleaner ^b		Aerosol	10	0.33	0.03
Motor Vehicle Wash ^a		All	0.2	0.38	0.14
Multi-purpose Lubricant – excluding solid & semisolid ^{c/e}		All	25 ^c	4.08	2.04
			10 ^e		1.27
Odor Remover/Eliminator ^a		Aerosol	25	***	0.00
		Non-aerosol	6	0.12	0.03
Penetrant ^c		All	25	0.40	0.15
Personal Fragrance Product (products with 20% or less fragrance) ^d		All	75 ⁺	10.89	0.41
Pressurized Gas Duster ^a		All	1	0	0
Sealant or Caulking Compound	Chemically Curing ^b	Non-aerosol	3	1.91	0.22
	Non-Chemically Curing ^a	Non-aerosol	1.5	0.68	0.12
Spot Remover ^a		Aerosol	15	0.76	0.24
		Non-aerosol	3	0.29	0.05
Tire or Wheel Cleaner ^a		Aerosol	8	0.01	0.00
		Non-aerosol	2	0.14	0.06
Windshield Water Repellent ^a		All	75	0.23	0.04
Total Emissions 2008		22.61 tons per day			
Total VOC Reductions 2015		5.76 tons per day			

* Survey emissions adjusted for market coverage,
and grown to the 2008 calendar year

** Grams per use limit provides emissions reductions equivalent
to 2.6% VOC limit, including fragrance

*** Omitted to protect confidentiality

+ Remove "Grandfather" clauses

Effective Dates:

a: 12/31/2010

b: 12/31/2012

c: 12/31/2013

d: 12/31/2014

e: 12/31/2015

**Table IV-4
Pressurized Gas Duster**

Survey Data	Product Form	Number of Products	2008 Category Sales (lbs/day)	2008 Adjusted GHG Emissions (CO₂e lbs/day)	2008 Adjusted GHG Emissions (CO₂e MMT/year)
2003	Aerosol	39	3,657	2,242,171	0.37
2007	Aerosol	90	7,292	2,179,855	0.36

Pressurized Gas Dusters have a sales-weighted average GHG content of over 99 percent by weight. As shown in Table IV-4, 39 duster products were reported for 2003 with adjusted sales of 3,657 pounds per day for 2008, and estimated GHG emissions of about 0.37 MMT CO₂e per year in California. Additionally, as shown in the table, 90 duster products were reported for 2007 with adjusted sales of 7,292 pounds per day for 2008, and estimated GHG emissions of about 0.36 MMT CO₂e per year.

Manufacturers of Pressurized Gas Dusters have been proactive in taking actions to reduce GHG emissions from gas dusters. Prior to 2003, where feasible, industry leaders voluntarily shifted away from using HFC-134a as the propellant in gas dusters to using HFC-152a (CSPA, 2008). These changes were captured and quantified in the 2007 Pressurized Gas Duster Survey Update. This is why the 2008 adjusted GHG emissions, shown above, have not increased proportionate to the category sales, which have nearly doubled. (For more details on the Pressurized Gas Duster proposal see Chapter VI).

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V. PROPOSED AMENDMENTS TO THE CONSUMER PRODUCTS REGULATION

In this Chapter, we provide a plain English description of the proposed amendments to the California Regulation for Reducing Volatile Organic Compound (VOC) Emissions from Consumer Products and explain the rationale for the amendments. The regulation is codified in title 17, California Code of Regulations, Division 3, Chapter 1, Subchapter 8.5, Article 2, Consumer Products, sections 94507-94517 (Consumer Products Regulation).

Where applicable, key terms or concepts involved in each proposed amendment are described. The discussion in this Chapter is intended to satisfy the requirements of Government Code Section 11343.2, which requires that a noncontrolling “plain English” summary of the regulation be made available to the public. The proposed amendments to the Consumer Products Regulation can be found in Appendix B.

First of all, the current title of the regulation, “Regulation for Reducing Volatile Organic Compound Emissions from Consumer Products,” implies that the intent of the regulation is solely to reduce VOC emissions from consumer products. In this rulemaking, however, we are proposing to add requirements related to climate change. To clarify that the regulation now specifies requirements to reduce VOCs and greenhouse gases (GHG), we are proposing to change the title of the regulation to “Regulation for Reducing Emissions from Consumer Products.” Additionally, amendments are being proposed to six sections in the Consumer Products Regulation: section 94508 “Definitions,” section 94509 “Standards for Consumer Products,” section 94510 “Exemptions,” section 94512 “Administrative Requirements,” section 94513, “Reporting Requirements,” and section 94515, “Test Methods.” These amendments are discussed below in detail.

In the sections below, we describe the proposed amendments and the rationale for them. The proposal includes the addition and modification of numerous definitions, a change in the definition of VOC to exclude a hydrofluoroether, new and lower VOC limits for multiple categories, and several changes to clarify existing sections of the Consumer Products Regulation. In addition, we are proposing to prohibit use of certain toxic compounds in several product categories. Our proposal also includes a provision to restrict the use of compounds with high global warming potential (GWP) in Pressurized Gas Duster products. A more detailed discussion of the existing regulatory requirements are referred to at the end of this Chapter (ARB, 2006a; ARB 2004b; ARB, 1999; ARB, 1997b; ARB, 1991a; ARB, 1990c).

A. DEFINITIONS (SECTION 94508)

Section 94508, “Definitions,” provides all the terms used in the Consumer Products Regulation which are not self-explanatory. The proposed amendments to the Regulation include new or revised definitions. These definitions are necessary to define categories proposed for VOC limits or GWP limits, or to improve enforceability of the Regulation.

Table V-1 lists proposed new definitions that are needed for product categories proposed for regulation. Because of the proposed definitional changes, section 94508(a) would also be reorganized to reflect proper alphabetical order. Chapter VI, contains a detailed discussion related to the proposal for each category.

Table V-1
New Definitions Proposed for Addition

Chemically Curing Sealant or Caulking Compound	Non-Chemically Curing Sealant or Caulking Compound
Fabric Softener – Single Use Dryer Product	Not for Retail Sale
Floor Maintenance Product	Odor Remover/Eliminator
Global Warming Potential	Tire or Wheel Cleaner
Global Warming Potential Value	Windshield Water Repellant
Motor Vehicle Wash	

Several of these definitions warrant a further description.

Global Warming Potential and Global Warming Potential Value

Of particular note, we are proposing new definitions for GWP and GWP Value. These definitions are necessary to implement our proposal to reduce the use of compounds with high GWPs used in Pressurized Gas Dusters. We are proposing to use the GWP definition of the Intergovernmental Panel on Climate Change (IPCC). GWP provides a measure of a compound's impact on global warming compared to carbon dioxide. The GWP Value definition specifies that the 100-year GWP values in the Second Assessment Report (SAR) of IPCC would be used to determine compliance. To enforce our proposal to reduce the use of compounds with high GWPs in Pressurized Gas Duster, the definition further specifies that, if the SAR does not contain a GWP value for a specific chemical or compound, then the IPCC, Fourth Assessment Report (FAR) GWP value for that chemical or compound can be used. If there is no GWP value listed for a specific chemical or compound in the SAR or the FAR, then the GWP value is assumed to be equal to the applicable GWP limit (i.e. the GWP limit established for specific consumer product categories).

Not for Retail Sale

We are also proposing to clarify what is meant by “not for retail sale.” The current regulation includes several provisions where an exemption from compliance is provided if certain criteria are met. For example, General Purpose Degreasers and Lubricants are not subject to VOC limits if they are sold exclusively to establishments which manufacture or construct good or commodities, and are labeled “not for retail sale.” Staff has received numerous inquiries as to what “not for retail sale” means, therefore, staff is proposing to define this term. As proposed, “Not for Retail Sale” means that a product is sold exclusively to establishments that manufacture or construct

goods or commodities, or are products sold to holders of commercial licenses (e.g. an electrician). For purposes of the regulation, “Not for Retail Sale” means the product is not sold in retail outlets or wholesale locations where household consumers may purchase them.

Table V-2, contains the list of existing definitions that are proposed to be modified. These changes are necessary to improve clarity, improve enforceability, or to describe the types of products that are excluded from another category definition.

Table V-2
Existing Definitions Proposed for Modification

Air Freshener	Lubricant
Astringent/Toner	Metal Polish/Cleanser
Carpet/Upholstery Cleaner	Multi-Purpose Dry Lubricant
Disinfectant	Multi-Purpose Lubricant
Dusting Aid	Penetrant
Existing Product	Personal Fragrance Product
Fabric Protectant	Pressurized Gas Duster
Fabric Refresher	Sealant or Caulking Compound
Floor Polish or Wax – Wood Floor Wax	Spot Remover
Glass Cleaner	Volatile Organic Compound

Two of the definitions listed in Table V-2 that are proposed for modification warrant a further description.

VOC Definition

As noted above, we are proposing to modify the definition of VOC to exclude hydrofluoroether (HFE) 7200. HFE 7200 is a solvent used in precision cleaning. In a report titled “Environmental Impact Assessment of Selected Halogenated Chemicals,” ARB staff determined that use of HFE 7200 has negligible impacts on ground-level ozone formation. It also has a fairly low GWP. No other adverse impacts were identified (ARB, 2008b). Therefore, to provide an additional reformulation option that could result in further VOC reductions, staff believes the exemption is appropriate.

Pressurized Gas Duster Definition

Currently, the definition for Pressurized Gas Duster describes a product used to remove dust on surfaces that cannot be cleaned with a solvent. In developing the proposal for Pressurized Gas Dusters, staff became aware that there are certain niche uses of these products where flammability is a concern. These products are formulated with a non-flammable propellant with a high GWP. At present time, no technology exists that would maintain this non-flammable aspect if these products were mandated to comply with our proposed GWP limit for this category. Therefore, staff is proposing a modification to the definition for Pressurized Gas Duster to exclude products used on

energized equipment as long as the Principal Display Panel specifies “Energized Equipment use only.” As proposed, products so-labeled would neither be subject to the GWP limit nor the VOC limit.

B. STANDARDS FOR CONSUMER PRODUCTS (SECTION 94509)

1. Proposed Amendments to Section 94509(a) - Table of Standards

The proposed regulatory action would amend the existing Consumer Products Regulation by specifying VOC limits for the product categories shown in Table V-3. Some of the categories are previously unregulated and others are currently regulated. For the currently regulated categories we are proposing lower VOC limits. The new or modified VOC limits would become effective between December 31, 2010 and December 31, 2015, as indicated in Table V-3. Note that in some cases different VOC limits are proposed based on product form. All of these changes would be reflected in the Table of Standards in section 94509(a). Several of the proposed VOC limits warrant additional explanation.

Proposal for Fabric Softener-Single Use Dryer Product

Fabric Softener-Single Use Dryer Product is a previously unregulated category. As shown in Table V-3, a grams of VOC per use limit is being proposed for these products, rather than a percent by weight limit. Our rationale for this proposal is described in section 2 below.

Proposal for Personal Fragrance Products

Staff is proposing that Personal Fragrance Products with 20 percent or less fragrance would be required to meet the existing January 1, 1999, limit of 75 percent by weight VOC. This would remove the so-called “Grandfather” clauses currently contained in subsections 94510(h) and (l). The reader is referred to Section C below for more information on this proposal.

Proposal for Furniture Maintenance Product

Although not shown in Table V-3, staff is proposing to reinstate the long-standing exemption for solid and paste forms of Furniture Maintenance Products. This exemption was inadvertently omitted during the 2006 rulemaking. The exemption clarifies that solid and paste forms of this type of product are not subject to the current VOC limit of three percent by weight.

Table V-3
Proposed VOC Limit, Product Forms, and Effective Dates

Product Category	Product Form	Proposed VOC Limit (wt%)	Effective Date
Astringent/Toner	All	35	12/31/10
Carpet/Upholstery Cleaner	Aerosol	5	12/31/10
	Non-aerosol	1	
Dusting Aid	Aerosol	17	12/31/10
	Non-aerosol	3	
Fabric Protectant	Non-aerosol	1	12/31/10
Fabric Softener – Single Use Dryer Product	All	0.05 grams per use	12/31/10
Floor Maintenance Product	All	1	12/31/10
Floor Polish or Wax (Wood Floor Wax)	All	70	12/31/10
Glass Cleaner	Aerosol	10	12/31/12
Motor Vehicle Wash	All	0.2	12/31/10
Multi-Purpose Lubricant	All*	25	12/31/13
	All*	10	12/31/15
Odor Remover/Eliminator	Aerosol	25	12/31/10
	Non-aerosol	6	
Penetrant	All	25	12/31/13
Personal Fragrance Product (products with 20% or less fragrance)	All	75**	12/31/14
Pressurized Gas Duster	Aerosol	1	12/31/10
Chemically Curing Sealant or Caulking Compound	Non-aerosol	3	12/31/12
Non-Chemically Curing Sealant or Caulking Compound	Non-aerosol	1.5	12/31/10
Spot Remover	Aerosol	15	12/31/10
	Non-aerosol	3	
Tire or Wheel Cleaner	Aerosol	8	12/31/10
	Non-aerosol	2	
Windshield Water Repellent	All	75	12/31/10

* Excluding solid and semisolid

** Remove “Grandfather” clauses

2. Other Proposed Amendments to section 94509

The following proposals pertain to other subsections of section 94509.

Proposed Requirement for Dilutable Products - Section 94509(b)(4)

Currently, section 94509(b) in the Consumer Products Regulation states that any product that is designed to be diluted prior to use is subject to the VOC limits specified in section 94509(a) after the product has been diluted. Staff has become aware of products packaged in pump spray containers that appear to be marketed as “ready-to-use” products, but are designed to be diluted by the user prior to use. Staff believes this approach to packaging may be diminishing anticipated VOC reductions, and is a potential circumvention of the intent of the regulation. Therefore, staff is proposing a modification to section 94509(b)(4), clarifying that the VOC limit for products sold in pump spray containers is applied prior to any minimum suggested dilution.

Date Coding Requirements – Section 94509 (i), (m), (n), (o) and (p)

Subsections 94509 (i), (m), (n), (o) and (p) specify prohibitions on use of certain chlorinated compounds in specified categories. We are proposing to clarify the date coding requirement that must be met to qualify as a “sell-through” product. As proposed, the product would need to comply with the product dating requirements beginning in section 94512(b).

Prohibition of Toxics from Specific Categories - Section 94509(q)

To mitigate a potential adverse environmental impact, staff is proposing a new subsection (q) within section 94509 to prohibit the use of methylene chloride, perchloroethylene, and trichloroethylene in “Carpet/Upholstery Cleaner,” “Fabric Protectant,” “Multi-Purpose Lubricant,” “Penetrants,” “Sealant or Caulking Compound,” and “Spot Remover.”

Under the California Environmental Quality Act (CEQA), ARB is required to identify and mitigate any possible adverse environmental impacts of regulatory actions. We believe that it is unlikely, but possible, that manufacturers may, in response to new VOC limits, choose to reformulate with chlorinated solvents that are Toxic Air Contaminants (TAC). Therefore, because there are many products that comply with the proposed limits, none of which contain chlorinated solvents, prohibiting their use is appropriate to reduce the public’s exposure to these TACs.

Staff is also proposing, in new subsection 94509(q)(2), language to describe the sell-through period and date coding requirements for the products listed above. It is being proposed that any of these products manufactured before December 31, 2010, can be sold, supplied, or offered for sale until December 31, 2013, as long as they comply with the date coding requirements beginning in section 94512(b).

Language for the notification requirements of the suppliers of the products listed above is being proposed in new subsection 94509(q)(3). This section requires that the seller must notify the purchaser of the sell-through period described in 94509(q)(2) only if the product is being sold or supplied to a distributor or retailer, and the product is being sold or supplied on or after June 30, 2013.

New subsection 94509(q)(4) is being proposed to establish that the requirements of 94509(q)(1) and 94509(q)(3) do not apply to products that contain methylene chloride, perchloroethylene, or trichloroethylene present as an impurity, or in amounts equal or less than 0.01 percent by weight.

In evaluating the use of these TACs, staff has become aware that certain Penetrants are designed for use on energized equipment. In these situations, the products must be non-flammable as a safety precaution. To provide this non-flammable aspect, the chlorinated solvents are used. At present time, staff is not aware of alternative solvents that can perform this function. Therefore, staff is proposing that Penetrants labeled "Non-flammable: For use on Energized Equipment Only" not be subject to this prohibition. This language would have to be displayed on the Principal Display Panel. These products would, however, be required to meet the proposed VOC limits.

Proposal for Pressurized Gas Dusters - Section 94509(r)

The reduction of GHGs from consumer products has been designated as a Discrete Early Action Measure in accordance with The California Global Warming Solutions Act of 2006. The emission reduction estimated for Consumer Products is 0.25 million metric tons of carbon dioxide equivalents (MMT CO₂e) per year. One of the first emission sources that has been identified is compounds used in aerosol products. As a first step, staff is proposing, in new subsection 94509(r)(1), that Pressurized Gas Dusters could not contain a chemical compound that has a Global Warming Potential of 150 or greater.

In accordance with CEQA, to ensure that the VOC content of these products do not increase as a result of reformulation to meet GWP limits, a one percent by weight VOC limit is also being proposed for Pressurized Gas Dusters. As a further mitigation measure, we are also proposing that Pressurized Gas Dusters could not contain the VOC exempt compounds methylene chloride or perchloroethylene. While reformulating with these TACs is unlikely, we believe prohibiting their use is prudent to ensure that there is no increase in exposure to these TACs.

Staff is also proposing in section 94509(r)(2) that Pressurized Gas Dusters manufactured before the effective date of the limit can be sold, supplied, or offered for sale until December 31, 2011, as long as the product complies with the product dating requirements beginning in section 94512(b).

Section 94509(r)(3) is being proposed to specify that any seller or supplier of Pressurized Gas Dusters must notify a purchaser of the product that the sell-through period ends on December 31, 2011. However, this notice must only be given if the product is being sold to a distributor or retailer, and the product is sold or supplied on or after June 30, 2011.

Section 94509(r)(4) is being proposed to specify that the fragrance exemption does not apply to Pressurized Gas Dusters. This proposal ensures that even with fragrance, the total VOCs in a Pressurized Gas Duster will not exceed one percent by weight. This is consistent with requirements under CEQA, as discussed above, to ensure that VOC emissions do not increase as a result of the proposed regulation.

Finally, Section 94509(r)(5) is being proposed to specify that any chemical compounds that are present as impurities in an amount, in aggregate, of 0.1 percent by weight or less, are not subject to the GWP limit or toxics prohibition for Pressurized Gas Dusters. Some of the chemical compounds used in Pressurized Gas Dusters may contain very small quantities of contaminants. This provision allows Pressurized Gas Dusters that contain those contaminants, present at very low levels, to comply with the regulatory provisions.

Staff has also become aware that certain Pressurized Gas Dusters are designed for use on energized equipment. In these situations the products must be non-flammable as a safety precaution. To provide this non-flammable aspect, propellants with high GWPs are used. At present time, staff is not aware of alternative propellants that can perform this function. Therefore, staff is proposing that Pressurized Gas Dusters that specify on the Principal Display Panel "Energized Equipment use only." be exempt from both the VOC and GWP limits.

Requirements for Fabric Softener – Single Use Dryer Product – Section 94509(s)

Staff is proposing a new subsection 94509(s) to describe the VOC content limit for Fabric Softener-Single Use Dryer Product. These products are typically made by applying liquid materials to a non-woven sheet substrate. Rather than a percent by weight limit, a 0.05 grams of VOC per use limit is proposed. The limit is designed to provide a level playing field and to ensure that the size of each dryer sheet does not increase. In developing the limit for these products, staff determined that establishing a percent by weight limit could result in the use of larger sheets to comply. This would diminish emission reductions and potentially lead to increasing the solid waste stream. Therefore, in accordance with CEQA requirements to mitigate potential environmental impacts, the grams per sheet limit is proposed. The 0.05 grams per use VOC limit is designed to provide a VOC reduction equivalent to that which would be achieved by setting a 2.6 percent by weight VOC limit (including 2 percent for fragrance). Because the limit already accounts for the fragrance, there is no need to provide the fragrance exemption contained in section 94510(c) for these products. This modification is proposed in section 94510(c).

C. EXEMPTIONS (SECTION 94510 (h) and (l))

At present, Personal Fragrance Products with 20 percent or less fragrance are required to meet an 80 percent by weight or a 75 percent by weight VOC limit, depending on when they first were introduced to the market. Products existing prior to setting these limits do not need to comply with either limit. Products that were introduced between 1995 and 1999 were required to meet the 80 percent by weight VOC limit, but were not required to reformulate to meet the January 1, 1999, limit. Only products introduced after January 1, 1999, are required to meet the 75 percent by weight VOC limit. These provisions are contained in subsections 94509(h) and (l). Staff is proposing to remove these “Grandfather” clauses. Under this proposal, all Personal Fragrance Products with 20 percent or less fragrance would be required to meet the 75 percent by weight VOC limit effective on December 31, 2014. These proposals are contained in new subsections 94510(h)(3) and (l)(1).

D. ADMINISTRATIVE REQUIREMENTS (SECTION 94512)

Proposed Modification to Product Dating Requirements – Section 94512(b)(1)

Currently, section 94512(b)(1) specifies that a product must clearly display the date or code indicating the date of manufacture. We are proposing language to clarify that a sequential batch number on a product package does not satisfy the product dating requirements.

Proposed Modification to Labeling Requirements – Section 94512(d)

Staff is proposing that non-aerosol Chemically Curing and Non-Chemically Curing Sealant or Caulking Compound products comply with additional labeling requirements specified in section 94512(d). Because different VOC limits are proposed, staff believes this is necessary to easily distinguish between Chemically Curing Sealant or Caulking Compound and Non-Chemically Curing Sealant or Caulking Compound. Section 94512(d) requires products to display the applicable regulatory category and VOC limit as a percent by weight. The information must be clearly visible. These provisions will improve enforceability.

E. REPORTING REQUIREMENTS (SECTION 94513)

Staff is proposing a 25 percent by weight VOC limit for Multi-purpose Lubricants and Penetrants, effective December 31, 2013. These are challenging but feasible limits within the time-frame proposed. For Multi-purpose Lubricants staff is proposing a technology forcing 10 percent second tier VOC limit, effective December 31, 2015. To ensure that manufacturers are on track, and that technology advances as expected, staff believes that manufacturers should demonstrate their progress toward meeting these limits.

Therefore, as proposed in new subsection 94513(f) Multi-purpose Lubricant and Penetrant manufacturers would need to supply detailed written updates on their research and development efforts undertaken to achieve compliance with the VOC limits. The reports would include sales and formulation data for products, as well as detailed information on the raw materials evaluated for use, maximum incremental reactivity (MIR) values for any VOC or LVP-VOC used or evaluated, the function of the raw material evaluated, testing protocols used, the results of the testing, the hardware evaluated, and the cost of reformulation efforts. The first report would be due on March 31, 2012, and would provide data for the 2011 calendar year. For Multi-purpose Lubricants, a second report would be due on March 31, 2014, and would provide data for the 2013 calendar year.

Should technical or commercial issues arise, or if it appears reductions could occur within a shorter timeframe, staff would develop appropriate measures to ensure air quality benefits occur as soon as possible.

F. TEST METHODS (SECTION 94515)

Staff is proposing to clarify that ARB's Method 310 be used as the analytical method to determine GWP content. This method already contains the necessary protocols to analyze for both HFC-152a and HFC-134a content.

REFERENCES

1. Air Resources Board. Environmental Impact Assessment of Selected Halogenated Chemicals – Staff Report. March, 2008. (ARB, 2008b)
2. Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation and the Aerosol Coatings Regulation. September 29, 2006. (ARB, 2006a)
3. Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Aerosol Coating Products, Antiperspirants and Deodorants, and Consumer Products Regulations, Test Method 310, and Airborne Toxic Control Measure for para-Dichlorobenzene Solid Air Fresheners and Toilet/Urinal Care Products. May 7, 2004. (ARB, 2004b)
4. Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation: Mid-term Measures II. September 10, 1999. (ARB, 1999)
5. Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation: Midterm Measures I. June 6, 1997. (ARB, 1997b)

6. Air Resources Board. Proposed Amendments to the Statewide Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products – Phase II – Technical Support Document. October, 1991. (ARB, 1991a)
7. Air Resources Board. Proposed Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products – Technical Support Document. August, 1990. (ARB, 1990c)

VI. DESCRIPTION OF PRODUCT CATEGORIES

In this Chapter, we provide the technical basis for the proposed limits for each category proposed for regulation. The following information is described for each of the product categories:

- a product category description;
- information on product use and marketing;
- information on the product formulations;
- a discussion of the proposed volatile organic compound (VOC) and/or global warming potential (GWP) limit, our rationale for the proposed limit, and the options for compliance; and
- if applicable, a discussion of outstanding issues associated with the proposal.

Chapter VI is divided into two parts. Section A includes descriptions of the product categories for which VOC limits are proposed. The product categories in Section A are in alphabetical order. Section B describes the product category for which a greenhouse gas (GHG) limit is proposed.

A. CATEGORIES FOR WHICH VOC LIMITS ARE PROPOSED

1. Astringent/Toner

Product Category Description:

The Astringent/Toner category consists of products which are designed or labeled to be applied to skin for the purpose of cleaning and tightening pores. For this rulemaking, only those Astringents/Toners not regulated by the Food and Drug Administration (FDA) are included. These products may also exfoliate, refresh, remove excess dirt, oil, impurities, and/or prepare the skin for moisturizing. While most Astringents/Toners are liquid products, there are also products sold in the form of substrate-impregnated pads. Astringent/Toner does not include any hand, face, or body cleaner or soap product, Medicated Astringent/Medicated Toner, Personal Fragrance Product, cold cream, lotion or Antiperspirant. Medicated Astringent/Medicated Toner means any product regulated as a drug by the FDA which is applied to the skin for the purpose of cleaning or tightening pores. In accordance with FDA rules, Medicated Astringents/Medicated Toners must be labeled such that the active ingredients in the product are identified.

Astringent/Toner is a previously unregulated category. Table VI-1 below summarizes the sales and emissions from Astringents/Toners based on the results of ARB's 2003 Survey (ARB, 2004a). The data have been grown to the 2008 calendar year. Total category sales are about 5,910 pounds per day.

**Table VI-1
Astringent/Toner***

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
All Forms	203	5,910	1,240

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

As indicated, 203 different branded Astringents/Toners were sold in California in 2003 by 73 companies. Astringent/Toner VOC emissions, adjusted to 2008, are about 1,240 pounds per day, or 0.62 tons per day, in California. Although not shown in Table VI-1, the sales-weighted average VOC content for this category is about 21 percent by weight.

Product Use and Marketing:

Astringents/Toners are used by both health professionals and household consumers to eliminate oil, decrease pore size, and/or remove dirt remaining on skin after cleansing. They may also exfoliate, refresh, tighten, and prepare the skin for moisturizing. Typically, the Astringent/Toner is dispensed onto a cotton ball or pad and the moistened cotton is wiped across clean and dry skin. The product is not rinsed but allowed to dry/evaporate off the skin. Many products recommend the use of a moisturizer once the Astringent/Toner has dried (Cote, 2006).

Astringents/Toners are sold in a variety of retail outlets including grocery stores, drug stores, beauty supply stores, discount stores, and department stores. Astringents/Toners are also available for purchase over the Internet. Examples of additional terms for Astringents/Toners include but are not limited to, skin tonic, freshener, refresher, and/or a clarifying lotion. The most common Astringent/Toner size is eight fluid ounces, although some companies offer smaller and larger sizes.

Product Formulation:

The VOC content of products in this category ranges from 0 to 60 percent by weight, with a sales-weighted average of 21 percent by weight. Astringents/Toners utilize ingredients that will dissolve excess oil and readily evaporate. These products typically contain water, low vapor pressure volatile organic compounds (LVP-VOC), fragrance and either ethanol, isopropyl alcohol, and/or witch hazel.

Proposed VOC Limit and Compliance:

As shown in Table VI-2 below, the proposed VOC limit for Astringent/Toner, is 35 percent by weight, effective December 31, 2010. Using emissions adjusted to 2010,

the proposed limit would result in an estimated emission reduction of 220 pounds per day, or about 0.11 tons per day.

Table VI-2 also shows that 70 percent of the market currently complies with the proposed 35 percent VOC limit.

**Table VI-2
Astringent/Toner Proposal***

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2010 Emission Reductions (lbs/day)+
All Forms	35	177	70	215	220

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2010 (see Chapter IV, Emissions).

As shown in Table VI-2, at the time of the 2003 Survey, over two-thirds of the market complied with the proposed VOC limit of 35 percent by weight. Most of these products comply by using slightly lower amounts of alcohol or volatile organic ingredients. We believe manufacturers will be able to comply by using the same ingredients that are being used today.

The proposed 35 percent VOC limit is designed to maintain efficacy among the variety of Astringent/Toner products currently available. Staff has information that indicates a 2:1 part water to alcohol ratio may be necessary for some products used on oily skin. This ratio of water to alcohol is needed for the Astringent/Toner to effectively dissolve sebum on oily skin (Idelle, 2008).

Staff has determined that reformulation to the proposed limit is technically feasible. The majority of products in this category are already low VOC, and there are many effective non-VOC alternatives available for substitution. Numerous products with VOC content below 35 percent are already available and well-accepted by consumers. Reformulation options that can be used by manufacturers to meet the proposed limit include reducing the level of alcohol and increasing the amount of water, LVP-VOCs, and/or exempted VOCs.

Issues:

- a. **Issue:** The full range of products that contain all levels of VOCs is necessary to maintain efficacy, and provide consumers with all options for skin treatment.

Response: All of the products within this category make similar claims on the label, including those containing 35 percent or less VOC.

- b. **Issue:** Manufacturers will change their non-medicated products to medicated allowing the use of the full range of VOCs.

Response: Staff disagrees. The cost to change a non-medicated product to medicated is considerable because of U.S. Food and Drug Administration requirements. These requirements would necessitate a change in formulation, the use of specific active ingredients such as salicylic acid, labeling modifications, and extensive record keeping.

- c. **Issue:** Any VOC limit on these products will negatively impact public health.

Response: As required in the California Health and Safety Code, we have consulted with staff at California Department of Public Health (DPH) with the specifics of our proposal. DPH staff do not oppose a VOC limit for non-medicated Astringents/Toners.

- d. **Issue:** Adequate sebum removal occurs with a two parts water to one part alcohol (by weight) ratio.

Response: Staff acknowledges and as a result is proposing a 35 percent VOC limit to accommodate products using alcohol to address oily skin.

- e. **Issue:** Setting a low VOC limit will eliminate some needed products.

Response: Staff disagrees. We believe all necessary functions of an Astringent/Toner can be met at a VOC level of 35 percent or less. In addition, 70 percent of the market already meets this limit which shows both technological and commercial feasibility with the proposed limit.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2004a)
2. Cote, Ryan. How to Use an Astringent Skin Toner in Your Skin Care Routine. <http://ezinearticles.com/?How-to-Use-an-Astringent-Skin-Toner-in-Your-Skin-Care-Routine&id=360826> (April 8, 2008). (Cote, 2006)

3. Idelle Labs. Telephone Conversation with ARB Staff. March 20, 2008. (Idelle, 2008)

2. Carpet/Upholstery Cleaner

Product Category Description:

Carpet/Upholstery Cleaner products are used for routine cleaning of soils on carpet and/or upholstery in homes, businesses, institutions, and vehicles. Typical fabrics include wool; cotton; nylon; and other carpet, rug, furniture, and automotive interior synthetic fibers. The category includes cleaning products with or without fabric protectant claims. Carpet/Upholstery Cleaner does not include Spot Removers, used for removing localized spots and stains; vinyl or leather cleaners; or products for exclusive use at industrial facilities engaged in furniture or carpet manufacture (i.e. industrial cleaners used only in production of carpet or furniture). The category also does not include Dry Cleaning Fluids (ARB, 1997b).

While there are three existing subcategories based on product form, each with a different VOC standard, only two VOC standards are being proposed for regulatory changes at this time: aerosol products and ready-to-use (RTU) non-aerosol products. The third VOC standard, applicable to dilutable non-aerosol products, is being retained at the current limit of 0.1 percent VOC (based on minimum dilution concentration). However, the proposal to clarify the category definition would apply to all product forms.

Carpet/Upholstery Cleaners were regulated under Midterm Measures I of the Consumer Products Regulation approved on July 24, 1997, and a description of the products is also included in the staff report for that rulemaking (ARB, 1997b). At that time, the Board adopted a 7 percent VOC limit for aerosol products, a 0.1 percent VOC limit for dilutable non-aerosol products, and a 3 percent VOC limit for RTU non-aerosol products. The adopted limits became effective January 1, 2001.

As discussed, the Carpet/Upholstery Cleaner category is intended to include products for routine cleaning of carpets/upholstery. The category does not include Spot Remover products for localized spots and stains.

Table VI-3 below summarizes the sales and emissions from Carpet/Upholstery Cleaners, based on the results of ARB's 2003 Survey (ARB, 2004a). The data have been grown to the 2008 calendar year. Total category sales are about 26,788 pounds per day.

**Table VI-3
Carpet/Upholstery Cleaner***

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
Aerosol	59	9,376	651
Non-Aerosol	117	17,412	583
Total	176	26,788	1,234

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

As shown in Table VI-3, estimated VOC emissions are about 1,234 pounds per day, or about 0.61 tons per day, in California. The sales-weighted average VOC content of the aerosol and non-aerosol products reported in the 2003 Survey was approximately 7 and 3 percent by weight, respectively.

Product Use and Marketing:

Aerosol products for carpets and rugs typically use an invertible aerosol container for downward spray application. The dispensed liquid or foam is left on the carpet or rug for several minutes to penetrate and loosen dirt, with or without agitation. To lift and remove the dirt, the area is either wiped with cloth (damp or dry, depending on the product) before the treated area is dry, or allowed to dry and then brushed or vacuumed. Products for upholstery are used in a similar manner.

The RTU non-aerosol products include not-to-be-diluted liquids, solids, and gel/semisolids. The liquids may be dispensed by mechanical spray (trigger or hand-pump-pressurized tank) and used in a manner similar to aerosols. The solids and gel/semisolids are granular or powder products applied to carpeting, brushed or agitated, and then vacuumed. Some products are used for pre-cleaning sections of carpeting, such as traffic lanes, prior to main cleaning such as by hot-water extraction.

Carpet/Upholstery Cleaners are used by household consumers, janitors, professional carpet/upholstery cleaners, and auto detailers in homes, businesses, institutions, and vehicles. Aerosol products are typically used by household consumers, while the RTU non-aerosol products are used by both household and commercial/institutional users.

Carpet/Upholstery Cleaners are available in general merchandise stores, super markets, auto parts stores, hardware stores, janitorial and maintenance supply warehouses, and over the Internet.

Product Formulation:

Aerosol products may contain 4 to 7 percent hydrocarbon propellant, VOC solvent cleaners, surfactants, emulsifiers, various inorganic and LVP-VOC ingredients, fragrance, ingredients to protect the metal aerosol container (corrosion inhibitors), and water. The VOC ingredients include glycol ethers (such as 2-butoxyethanol), alcohol, and hydrocarbon distillates. Some products use LVP-VOC glycol ethers. Many products contain surfactant cleaners (which are generally LVP-VOCs). When fabric protection is claimed, the product contains a polymer to be left behind on the fabric. Other propellants include carbon dioxide, dimethyl ether, and nitrous oxide (N₂O). The very low-VOC products are generally surfactant-based, and VOC levels largely reflect only the hydrocarbon propellants.

While the RTU non-aerosol products show a greater variety of formulations and ingredients, there are some similarities to the aerosol products when considering there is no propellant. The VOC ingredients may include glycol ethers (such as 2-butoxyethanol), alcohol, hydrocarbon distillates, and d-limonene. Some products use LVP-VOC glycol ether or LVP-VOC hydrocarbon solvents. Surfactants are common; sodium lauryl sulfate is typical. Some products are shampoos, formulated to remove particles and inorganic contaminants, and may address oily dirt to some extent as well. The few that reported solid (powder or granular) and gel/semisolid products in this subcategory showed varied formulations.

Proposed VOC Limit and Compliance:

The proposed VOC limits for Carpet/Upholstery Cleaner are 5 percent VOC by weight for aerosol products, and 1 percent VOC for RTU non-aerosol products, effective December 31, 2010. As shown in Table VI-4, using emissions adjusted to 2010, the proposed limits will result in an estimated emission reduction of 302 pounds per day, or about 0.15 tons per day.

Table VI-4 also shows that about 10 percent of the market for aerosol products, and 25 percent of the RTU non-aerosol market, currently comply with the proposed VOC limits.

The proposed 5 percent VOC limit for aerosol products would allow approximately 1 to 2 percent VOC cleaning solvent, along with 3 to 4 percent VOC hydrocarbon propellant, in water-based formulations. The VOC may be glycol ethers such as 2-butoxyethanol, alcohol, or hydrocarbon solvent. Another option is use of non-VOC propellants, such as N₂O, to enable up to 5 percent VOC cleaning solvent. A third option is to use up to 5 percent VOC hydrocarbon propellant, and rely on LVP-VOC surfactant cleaners, LVP-VOC solvent cleaners such as glycol ethers, and inorganic cleaners.

**Table VI-4
Carpet/Upholstery Cleaner Proposal***

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2010 Emission Reductions (lbs/day)+
Aerosol	5	7	10	147	150
Non-Aerosol	1	54	25	149	152
Total	-----	61	-----	296	302

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2010 (see Chapter IV, Emissions).

The proposed 1 percent VOC limit for RTU non-aerosol products is intended to enable up to 1 percent VOC cleaning solvent. Many products are already below 1 percent VOC. As with aerosol products, the main cleaning ingredients are LVP-VOC surfactant or LVP-VOC glycol ethers.

The 2003 survey data show very limited use of perchloroethylene (an exempt chlorinated compound) and trichloroethylene (a VOC chlorinated compound) in this category. While ARB staff believes these toxic air contaminants are not likely to be used as cleaning solvents in the future reformulated products, ARB staff is proposing that perchloroethylene, trichloroethylene, and methylene chloride be prohibited in Carpet/Upholstery Cleaners. This prohibition is proposed to ensure that manufacturers do not choose to reformulate with toxic chlorinated solvents in response to the lower VOC limits. Staff has determined that currently available formulation technologies do not contain perchloroethylene, trichloroethylene, or methylene chloride, thus they are not needed to comply with the proposed standard. See Chapter VIII for a discussion of the health effects of perchloroethylene, trichloroethylene, and methylene chloride.

Issues:

- a. **Issue:** The sales-weighted average (SWA) for Carpet/Upholstery Cleaner (non-aerosol-RTU), complying market share, and tons per day VOC reduction do not appear consistent.

Response: The SWA includes high-VOC sell-through and non-complying products, some with VOC content considerably above the 3 percent VOC limit in effect in 2003. However, the emission reduction must be corrected to avoid double-counting reductions associated with a prior rulemaking, and to not overestimate the emission reduction from the current rulemaking. The correction is done by lowering all high-VOC products above the limit, down to the 3 percent VOC limit in effect in 2003. This makes the uncorrected SWA appear

inconsistently high, compared with the corrected VOC reduction. Also, there were substantial sales of low-VOC products complying with the proposed 1 percent VOC level, and hence well below the 3 percent VOC limit in effect in 2003. This additionally makes the SWA appear inconsistently high compared with the relatively high complying market share with the 1 percent VOC proposed limit.

- b. **Issue:** Lowering of the VOC limit for aerosol Carpet/Upholstery Cleaner to 5 percent by weight could impact the feasibility of foaming products to not leave soil-attracting residues. A lowering of the VOC limit could also adversely impact the ability of the propellant to empty the can. As such, we suggest the VOC limit be set no lower than 6 percent by weight.

Response: The 2003 survey data show several aerosol foaming products, using conventional hydrocarbon propellants, complying with the proposed 5 percent VOC limit for aerosol products. Also, we do not expect the concentration of LVP-VOC cleaners, in reformulated products, to be high enough to cause residue problems. Regarding propellant use, a few reported products contained only 3.0 to 3.5 percent VOC propellant. We therefore believe there would be no problem with either soil-attracting residues or with emptying the aerosol container.

- c. **Issue:** Non-VOC propellants such as HFC-152a are not suitable for foaming aerosol products, because the non-VOC propellants lack the solubility of conventional hydrocarbon propellants, needed for adequate foam generation.

Response: As discussed above, the 2003 survey data show several foaming products, using conventional hydrocarbon propellants, complying with the proposed 5 percent VOC limit for aerosol products. We believe the use of non-VOC propellants, such as HFC-152a, is generally not necessary, so there should be no problem with foam generation.

- d. **Issue:** For Carpet/Upholstery Cleaner (non-aerosol-RTU), any lowering of the current 3 percent VOC limit could impact the feasibility of products to not leave soil-attracting residues.

Response: The 2003 survey data show that many RTU non-aerosol products comprising 25 percent market share already comply with the proposed 1 percent VOC limit. Therefore, we believe there should be no problem with soil-attracting residues.

- e. **Issue:** Some products listed as Carpet/Upholstery Cleaner (non-aerosol-RTU) may actually be Spot Removers, which do not belong with Carpet/Upholstery Cleaners.

Response: Generally, products are categorized as reported by the marketer, and if clearly mis-categorized, with adjustments by ARB staff. Some product

names and label claims may be inconsistent. If a product is both a Spot Remover and a Carpet/Upholstery Cleaner, we would consider the product a Carpet/Upholstery Cleaner if label directions recommend broad-area (non-localized) use of the product.

- f. **Issue:** Precleaner liquid and powder products are not Carpet/Upholstery Cleaner - non-aerosol RTU products.

Response: These products already fall into the definition of Carpet and Upholstery Cleaner in section 94508(a)(26) of the Consumer Products Regulation. As non-aerosol RTU products, they have been subject to the currently effective 3 percent VOC limit since January 1, 2001.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2004a)
2. Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation: Midterm Measures I. June 6, 1997. (ARB, 1997b)

3. Dusting Aid

Product Category Description:

Dusting Aid means a product designed to assist in removing dust and other soils from floors and other surfaces without leaving a wax or silicone-based coating. Dusting Aids do not include Pressurized Gas Duster Products, or Furniture Maintenance Products, which are regulated as separate categories.

The Board adopted standards limiting the VOC content of Dusting Aids in January of 1992 as part of Phase II of the consumer products rulemaking. Two tiers of standards were adopted for aerosol products. The first tier set a VOC limit of 35 percent by weight, effective on January 1, 1995. The VOC limit was reduced to 25 percent by weight, effective January 1, 1997. In addition, the Board adopted a 7 percent VOC limit for non-aerosol Dusting Aids, effective January 1, 1995, (ARB, 1991a).

Table VI-5 below summarizes sales and VOC emissions from Dusting Aids based on the results of ARB's 2003 Survey (ARB, 2004a). The data have been grown to the 2008 calendar year. Total category sales are about 3,108 pounds per day.

**Table VI-5
Dusting Aid***

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
Aerosol	41	2451	565
Non-aerosol	38	657	13
Total	79	3108	578

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

Estimated VOC emissions from the entire category are 578 pounds per day, or about 0.29 tons per day. As shown in Table VI-5, aerosol Dusting Aids account for 79 percent of the total category emissions. Aerosol Dusting Aids have a sales-weighted average VOC content of about 23 percent by weight. The non-aerosol products, which include liquids, liquid impregnated wipes, and pump sprays, have a sales-weighted average VOC content of approximately 21 percent.

Product Use and Marketing:

Dusting Aids are products that assist in removing dust and other soils from floors and other surfaces without leaving a wax or silicone based coating. The product is applied to dust mops, dust cloths, or feather dusters to increase the ability of the mop head or cloth to attract and hold dust particles, lint, pet dander, hair, and dirt. These products are used on furniture, molding, window blinds, ceiling fans, window frames and sills, radiators, woodwork, floors and any other surface where dust collects. Dusting Aids are also used as a filter dressing for heating and cooling systems to attract dust, dirt, lint, and pollen to keep it from entering the system. Some products may also be labeled to remove fingerprints, allergens, smudges, or oil-based stains from surfaces such as wood paneling, cabinets, furniture, or floors.

Dusting Aids contain oils or cationic quaternary ammonium compounds that attract negatively charged dust to the cloth or mop head. To prevent leaving a slippery residue on floors, some products recommend that the product be applied to the mop head the day prior to use. This cure time allows the product to penetrate and diffuse throughout the dust mop strands. For wood surfaces, Dusting Aids are marketed to be used between polishes to remove surface dullness.

While there is some overlap in the functions provided by Furniture Maintenance Products and Dusting Aids, the categories can be distinguished. Dusting Aids are primarily used for dusting, including dusting of furniture and floors, without leaving a wax or silicone-based coating. Furniture Maintenance Products are used primarily to polish furniture, leaving a wax or silicone-based protective coating. Although some Furniture

Maintenance Products may be used to dust furniture, they are not used for dusting floors, because they would leave a slippery residue.

Product Formulation:

Dusting Aids typically contain water, LVP-VOCs, VOCs, hydrocarbon propellants (in aerosols), and small amounts of other agents such as emulsifiers, dust attractants and fragrances (ARB, 2004a). The active ingredients used to lift and absorb dust particles can be a light hydrocarbon oil, orange oil, or a cationic quaternary ammonium compound.

The solvents used in Dusting Aids include water; hydrocarbons, such as odorless mineral spirits or petroleum distillates; LVP-VOCs such as glycol ethers; or volatile methyl siloxanes. Aerosol products typically contain hydrocarbon propellants such as propane and isobutane.

Proposed VOC Limit and Compliance:

The proposed VOC limit for aerosol Dusting Aids is 17 percent by weight, effective December 31, 2010. The proposed VOC limit for non-aerosol Dusting Aids is 3 percent by weight, effective December 31, 2010. As shown in Table VI-6, the proposed limits will result in an estimated VOC reduction of 155 pounds per day, or about 0.08 tons per day. The proposed 3 percent by weight VOC limit for non-aerosol products is not expected to achieve reductions in VOC emissions. Requiring further reductions was not cost-effective. The limits are designed to be consistent with those for Furniture Maintenance Products.

Table VI-6 also shows that about 5 percent of the market currently complies with the proposed 17 percent VOC limit for aerosol Dusting Aids. For non-aerosol Dusting Aids, 77 percent of the market complies with the proposed 3 percent VOC limit.

As described in the Product Use and Marketing section, there is some overlap in the functions provided by Furniture Maintenance Products and Dusting Aids. Because of the similarity in formulation and function, we expect that the technology used in Furniture Maintenance Products can be transferred for use in Dusting Aids. Reformulation options include the use of LVP-VOC hydrocarbons, LVP-VOC glycol ethers, and water.

**Table VI-6
Dusting Aid Proposal***

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2010 Emission Reductions (lbs/day)+
Aerosol	17	13	5	151	155
Non-aerosol	3	33	77	0	0
Total	-----	46	-----	151	155

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2010 (see Chapter IV, Emissions).

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4. Fabric Protectant (non-aerosol)

Product Category Description:

Fabric Protectants are applied to fabric substrates to protect the surface from dirt, soil, and other contaminants, and from stains that may result. While some products also provide water repellency, Fabric Protectants are used specifically to protect against dirt, soil, or stains. Products which solely provide water repellency (i.e. water-proofing protection), without any claim for dirt, soil, or stain protection, are considered Waterproofer products, and are not included in the Fabric Protectant category. Typically, Waterproofer products are silicone-based, while some Fabric Protectant products (notably the aerosols) are fluoropolymer-based (ARB, 1991a).

Fabric Protectants were regulated under Phase II of the Consumer Products Regulation adopted in January 1992, and a description of the product category is also included in the staff report for that rulemaking (ARB, 1991a). At that time, the Board approved the staff recommendation of a 75 percent VOC limit for all product forms effective January 1, 1995, along with a 60 percent VOC limit for all product forms subsequently effective January 1, 1997. The 60 percent VOC limit for all product forms remains in effect.

The current proposal for a specifying a lower VOC limit pertains only to the non-aerosol products, for reasons discussed later. Table VI-7 below summarizes the sales and emissions from ARB's 2003 Survey (ARB, 2004a). The data have been grown to the 2008 calendar year. Total category sales are about 5,517 pounds per day.

**Table VI-7
Fabric Protectant***

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
Non-Aerosol	63	5,517	366

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

Estimated VOC emissions of non-aerosol Fabric Protectants are 366 pounds per day, or about 0.18 tons per day. Although not shown, the sales-weighted average VOC content for this category is 5 percent by weight.

Product Use and Marketing:

Fabric Protectants are used by household consumers and outdoor recreational enthusiasts; as well as commercial and professional workers for clothing care, upholstery care, carpet care, and automotive interior care. Fabric Protectants may be used for household fabric articles such as bed covers, quilts, craft, and vehicle upholstery. Fabric Protectants are also used on the fabric tops of convertible automobiles.

Non-aerosol products are typically applied by mechanical spray on clean fabric articles, and left to dry. A resin film, usually very thin and often invisible, is formed and left behind on the fabric fibers. Occasional re-application may be needed to maintain protection (ARB, 1991a).

Fabric Protectants are sold in general merchandise stores, supermarkets, hardware stores, recreational equipment stores, auto parts stores, janitorial and maintenance supply warehouses, and over the Internet.

Product Formulation:

The non-aerosol products are liquid, mechanical-spray-applied products, some sold as dilutables (i.e. concentrates). Most formulations are water-based with low levels of VOCs. Typical VOCs include glycol ethers and alcohol. Non-VOC products represented approximately 42 percent of the non-aerosol sales. The sales-weighted average VOC content of the products reported in the 2003 Survey was 5 percent by weight.

Proposed VOC Limit and Compliance:

The proposed VOC limit for non-aerosol products is 1 percent VOC by weight, effective December 31, 2010. As shown in Table VI-8, using emissions adjusted to 2010, the proposed limit will result in an estimated emission reduction of 163 pounds per day, or about 0.08 tons per day. Table VI-8 also shows that about 95 percent of the non-aerosol market currently complies with the proposed 1 percent VOC limit.

Table VI-8
Fabric Protectant Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2010 Emission Reductions (lbs/day)+
Non-Aerosol	1	42	95	159	163

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2010 (see Chapter IV, Emissions).

The proposed 1 percent VOC limit is intended to allow for complying water-based formulations. As discussed above, the 2003 survey data showed many non-aerosol products are water-based and already are low or non-VOC.

The 2003 survey data show very limited use of perchloroethylene (an exempt chlorinated compound) and trichloroethylene (a VOC chlorinated compound) in this category. While it is not likely these toxic air contaminants will be used as cleaning solvents in the future reformulated products, ARB staff is proposing that perchloroethylene, trichloroethylene, and methylene chloride be prohibited from use in Fabric Protectant products. This prohibition is proposed to ensure that manufacturers do not choose to reformulate with toxic chlorinated solvents in response to the lower VOC limits. Staff has determined that currently available formulation technologies do not contain perchloroethylene, trichloroethylene, or methylene chloride, thus they are not needed to comply with the proposed standard. See Chapter VIII for a discussion of the health effects of perchloroethylene, trichloroethylene, and methylene chloride.

Issues:

- a. **Issue:** The proposed 1 percent VOC limit for non-aerosol Fabric Protectants may be feasible for some types of products, but not others.

Response: The commenter did not identify which types of products for which the proposal may not be feasible. A review of labels for products that comply with the proposed standard shows a variety of claims, demonstrating the proposal is feasible for many types of products. No specific claims were found

on the labels of non-complying products that could not also be found on the labels of complying products. In addition, the large complying market share for the non-aerosol products suggests that the proposal is feasible.

- b. **Issue:** The proposed VOC limit for aerosol products is not feasible for products labeled for use on upholstery.

Response: Regarding the aerosol products, ARB staff believes that survey year 2003 was likely within the transition period during which industry conducted research and development and phased in replacement products using new chemical technologies, following the phase-out of the perfluorooctanyl chemistry products at the end of 2000 (3M, 2007; 3M, 2000a; 3M, 2000b; U.S. EPA 2000). Also, five years have passed since the 2003 survey, so current products may be the result of several transitional changes. Therefore, products marketed now may be substantially different in terms of product formulations, sales, and possible VOC emission reductions, compared with the products in the 2003 survey. Staff therefore plans to defer proposing a VOC standard for aerosol Fabric Protectants and intends to re-survey the aerosol products to obtain more representative data. Staff will reconsider the VOC limit for aerosol products in a future rulemaking, assuming that the phase-in of new technologies has largely been accomplished.

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5. Fabric Softener – Single Use Dryer Product

Product Category Description:

Fabric Softener – Single Use Dryer Product is a laundry care product designed or labeled for single use in the clothes dryer to impart softness to, or control static cling of, a load of washable fabrics; and may impart a fragrance or scent. For the purpose of this definition only, “single use” means a product that is intended for one time use during a single drying cycle and is removed after completion of the drying cycle. A “load” is the amount of washable fabrics in a single drying cycle. Fabric Softener – Single Use Dryer Product includes treated non-woven sheets which are typically packaged in boxes with a multiple number of sheets. Fabric Softener – Single Use Dryer Product does not include products applied to washable fabrics prior to placing the washable fabrics in the clothes dryer and multiple use dryer-added products.

These products are often sold in packages of as little as 20 sheets to as many as 200 sheets per box and are available in both scented and unscented varieties. A product brand may have more than one fragrance variant. Based on the shelf survey conducted by ARB staff in 2006 and Internet searches, the majority of dryer-added fabric softener products are sold as single use sheets but are also available to consumers in multiple use products such as packets, sachets, blocks and dryer balls. However, the Fabric Softener – Single Use Dryer Product category only applies to single use products.

Fabric Softener – Single Use Dryer Product is a previously unregulated category. Table VI-9 below summarizes the sales and emissions from products in the Fabric Softener – Single Use Dryer Product category based on the results of ARB’s 2003 Survey (ARB, 2004a). The data have been grown to the 2008 calendar year. Total category sales are about 26,804 pounds per day.

**Table VI-9
Fabric Softener--Single Use Dryer Product ***

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
All Forms ⁺	26	26,804	1,037

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Only the amount of product impregnated on a sheet reported. The mass of the sheet is not included.

As shown in Table VI-9, products in the Fabric Softener – Single Use Dryer Product category have estimated VOC emissions of about 1,037 pounds per day, or about 0.52 tons per day, in California. Although not shown, the SWA-VOC content for this category is about 4 percent by weight (including all fragrance but excludes the sheet) or about 0.08 grams of VOC per sheet.

Product Use and Marketing:

Fabric softener products can often be found as liquid and sheet products. According to the Soap and Detergent Association (SDA), 86 percent of households use a fabric softener product; with 40 percent preferring a dryer-added sheet product, 21 percent using a washer-added product, and 25 percent using both (SDA, 2006b). Dryer-added products are used to treat laundered fabrics in the clothes dryer. These products claim to soften clothes and eliminate static cling, or add a fresh scent. To impart softness refers to a “quality of the fabric in which its “hand” or feel to the touch is smooth, pliable and fluffy, as distinguished from coarse or scratchy” (US Patent, 2005). The term static cling refers to the “tendency of articles of clothing to adhere to one another after being dried in clothes dryer as a result of static electrical charges created on the surface of the fabric” (US Patent, 2005).

The dryer-added and washer-added products provide the same softening and anti-static benefits. The dryer-added sheet products are perceived to be more convenient to use, being added into the clothes dryer as opposed to the washer rinse cycle. Dryer-added sheet products are generally sold as single use products. Single use and multiple use products refers to “the number of drying cycles in which the fabric treatment composition can be used and release an effective amount of a fabric treatment agent to fabric that is being dried during the operation of a dryer (US Patent, 2007).” Typically, one sheet is used per drying cycle, with larger/atypical loads requiring up to two sheets per drying cycle. While dryer-added fabric softener products are more commonly used, liquid fabric softeners added to the clothes washer are more effective at softening clothes. This is because the wash water allows the softening ingredients to more easily penetrate into the fabric (SDA, 2006b).

Both scented and unscented fabric softener products are marketed. According to the U.S. National Academy of Sciences, “15 percent of the U.S. population is hypersensitive to chemicals, including fragrances” (Clements, 2006). In order to meet market demand, companies have responded with unscented products.

Fabric softener products are typically found in both household and commercial settings. They are available to consumers through national and private store label brands, with the national brands owning a large share of the market. Most fabric softener products are available for purchase in grocery stores, diversified pharmacies, warehouses, superstores, laundromats, and from Internet companies.

Product Formulation:

Products in the Fabric Softener – Single Use Dryer Product category are formulated with cationic and nonionic softening agents, used to soften fabric and control static cling; water, used as a perfume carrier; fragrances, for aesthetic appeal; and/or inorganic materials such as preservatives, effective in “preventing biological degradation of the composition and substrate” (US Patent, 2005). These ingredients are typically impregnated on a non-woven sheet of synthetic fabric, and released by the heat and direct contact with the fabrics during the tumbling action of the clothes dryer.

Dryer-added fabric softener products contain the same types of cationic compounds as those found in the washer-added fabric softener products, however, the dryer-added products contain alkyl sulfate salts instead of chloride salts (SDA, 2006a). The active ingredient consists of cationic fabric softening agents, known as quaternary ammonium compounds, used to impart softness to laundered fabrics. One side of the quaternary molecule contains a positively charged atom that binds to the negatively charged fabrics. The other side of the molecule consists of a long chain fatty material that leaves a coating on the fabric, making the fabric soft and controlling static cling (Kozen, 2006). Dryer-added fabric softener products may also contain long chain fatty based hydrocarbon nonionic molecules. “These nonionics have no positive charge but are effective in the dryer where deposition depends mostly on physical contact” (SDA, 2006a).

Along with its cationic and nonionic ingredients, dryer-added fabric softener products may also contain fragrances in their formulation. Data reported in the 2003 Survey shows that the VOC ingredients found in dryer-added fabric softener products are mostly attributed to fragrances, with fragrance ranging from zero to 8 percent by weight (ARB, 2004a). According to the Fragrance Material Association (FMA), there are approximately 2,500 individual fragrance materials currently available, with mixtures of these materials containing as many as 50 to 300 individual chemical entities (FMA, 2006). These fragrance materials may be naturally derived or synthetic, having a floral, woody or citrus scent. Because of the vast combination of mixtures to work with, companies are able to offer fabric softener products with different types of scents.

Proposed VOC Limit and Compliance:

The proposed VOC limit for products in the Fabric Softener-Single Use Dryer Product category is 0.05 grams of VOC per use. Staff believes, and some industry stakeholders have agreed, that the proposed gram of VOC per use limit, instead of a percent by weight VOC limit, is more appropriate for this category as it would provide a level playing field and ensure that the size of the sheet substrate does not increase (SDA, 2008a). This proposed limit includes all VOCs in the product, including fragrance.

Staff's proposal for grams of VOC per use limit would provide a level playing field as manufacturers apply varying amounts of liquid to the sheet substrate and the VOC content on the sheet substrate may not be the same as the formulation of the liquid applied to the sheet during manufacture. As indicated by manufacturers, some of the water or fragrance in the liquid formulation could be driven off during the drying process. Also, a liquid with a lower VOC weight percent that is applied to the sheet in a large quantity could deposit more VOC on the sheet compared to a higher VOC weight percent liquid that is applied in a smaller quantity.

The grams of VOC per use limit is designed to ensure that the size of the sheet substrate does not increase. In developing the limit for these products, staff determined that establishing a VOC percent by weight limit could result in manufacturers using larger size sheets to comply. This would diminish emissions reductions and potentially lead to increasing the solid waste stream. Therefore, to mitigate this potential and in accordance with the California Environmental Quality Act (CEQA), the grams of VOC per use limit is proposed.

The 0.05 grams of VOC per use limit provides emission reductions equivalent to setting a 2.6 percent by weight VOC limit (including fragrance). Because the limit already accounts for the fragrance, there is no need for the fragrance exemption provided in section 94510(c) for these products (ARB, 2007a). This modification is proposed in section 94510(c).

Compliance with the VOC limit shall be determined per sheet, or equivalent delivery substrate, based on the minimum recommended use for a single drying cycle specified on the product packaging or label. In other words, if one sheet is the minimum recommended use for a single drying cycle, then the VOC limit applies per sheet. If two sheets are the minimum recommended use for a single drying cycle, then the VOC limit applies to the aggregate VOC content in two sheets. "Minimum recommended use" does not include recommendations for incidental use of additional sheets, or equivalent delivery substrate, for limited applications such as for extra large or double loads of washable fabrics in large capacity clothes dryers.

As shown in Table VI-10, using adjusted 2010 emissions, the proposed limit would result in an estimated emission reduction of 414 pounds per day, or about

0.21 tons per day. Table VI-10 also shows that 24 percent of the market currently complies with the proposed 0.05 grams of VOC per use limit. This limit would become effective December 31, 2010.

**Table VI-10
Fabric Softener – Single Use Dryer Product Proposal***

Product Form	Proposed Grams of VOC per Use Limit	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2010 Emission Reductions (lbs/day)+
All Forms ⁺⁺	0.05	20	24	404	414

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey emissions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Survey emissions adjusted for complete market coverage and grown, by population, to 2010 (see Chapter IV, Emissions).

++ Only the amount of product impregnated on a sheet reported. The mass of the sheet is not included.

In proposing this limit, we find that 24 percent of the market (20 out of 26 products, both scented and unscented) complies with the proposed 0.05 grams of VOC per use limit (ARB, 2004a). The proposed limit will not require a change to the active ingredients or in the amount of active ingredients used in the formulation of the product. The active ingredients, LVP-VOCs, are not considered when determining compliance with the proposed limit, per the exemption provided in section 94510(d) (ARB, 2007a).

As described above, the main ingredients found in dryer-added fabric softener products are cationic and nonionic softening agents also known as quaternary ammonium compounds, water, fragrances and inorganics. The active ingredients used are LVP-VOCs. The primary VOC ingredient in this category is the fragrance, which currently ranges from zero to 8 percent by weight (ARB, 2004a). Staff believes fragrance is the VOC ingredient most likely to be reduced in the reformulation of a product. Reformulation under the grams of VOC per use strategy would only require manufacturers to reduce the amount of fragrance while keeping the active ingredients the same.

Although fragrances provide an important attribute for many customers, fragrances do not contribute to the primary function of softening fabric. Manufacturers should not have significant difficulty reformulating their products to meet the proposed limit of 0.05 grams of VOC per use. As indicated by the 2003 Survey, only a small number of companies would have to reformulate to meet this limit. Private label companies would not have to reformulate, but only request that their formulators use existing formulations which currently meet the proposed limit.

Issues:

- a. **Issue:** ARB has proposed a new category (Fabric Softener – Single Use Dryer Product) and definition that go substantially beyond the category covered by the 2003 Consumer Product Survey. ARB surveyed for all the “sheet” form of dryer products and did not include “packets, sachets, and dryer balls.”

Response: The CARB 2003 Consumer Products Survey not only surveyed for “Dryer Sheets” but “Other Laundry Products,” “In-Dryer Fabric Care” and “Fabric Softener.” All dryer-added products that were sold in California in 2003 should have been reported in one of these four categories. Dryer-added products are available not only as sheets, but in other forms. However, staff’s proposal only applies to single use dryer products.

- b. **Issue:** The products reported in this category of the survey all appear to soften fabric. Although they may provide other benefits in terms of fabric care, their primary purpose is softening. Inclusion of products that “prevent static cling, reduce wrinkles, reduce drying time, [and] make ironing easier” would be inappropriate since it would capture products on the market now or in the future that are designed with these primary purposes and may not, as the category name implies, soften fabrics.

Response: Based on staff evaluation of the product labels submitted by manufacturers, a large percent of products surveyed made claims of both softening as well as controlling static cling. ARB staff revised the definition as suggested by SDA but retained the anti-static property as this claim is often seen on the labels of most fabric softener products.

- c. **Issue:** Fragrance is a very desirable quality for consumers who use fabric softener sheets. If the amount of fragrance per softener sheet is reduced, consumers will use more to compensate. This will result in less emissions reduction achieved. There will be a significant impact on the environment from increased solid waste and shipping-related energy and air emissions.

Response: While acknowledging that some consumers may increase their usage of fabric softener sheets in response to reduced fragrance, ARB staff does not believe that the proposed regulation will significantly increase consumer usage. No data were provided to support this claim. Consumer use data provided by SDA indicate that 80 percent of consumers use one sheet or less per drying cycle (SDA, 2008b). Increasing usage to two sheets would translate to added cost that many consumers may not be willing to pay. In addition, using two sheets would deposit more softening ingredients on the fabric and customers may notice a different “feel” to the fabrics. However, staff will use its periodic surveys to monitor product sales and take appropriate action if any unanticipated increased usage is occurring.

- d. **Issue:** The low market share, 24 percent, for existing products complying with the proposed 0.05 grams of VOC per use limit indicates that this limit is not technologically and commercially feasible. If sales of unscented products were excluded, then the complying market share is even lower. Customers will find that reformulated products will not meet their needs and switch to liquid fabric softener products. These products are heavier than dryer sheet products and are packaged in bulky plastic containers. This will result in a significant impact on the environment from increased solid waste and shipping-related energy and air emissions.

Response: Staff disagrees. No data were provided to support this claim. The 24 percent complying market share, with 20 complying products out of 26 products, indicates that the proposed 0.05 grams of VOC per use limit is technologically and commercially feasible. However, staff intends to monitor product sales through periodic surveys, as is always done, to ensure that unintended consequences of establishing the proposed VOC limit does not occur.

- e. **Issue:** The up to 2 percent by weight fragrance exemption per section 94510(c) should be provided to Fabric Softener-Single Use Dryer Product. It sets a bad precedent to treat Fabric Softener-Single Use Dryer Product differently from other regulated product categories.

Response: The softening and anti-static active ingredients in fabric softeners are LVP-VOCs. Fragrance, therefore, is the primary ingredient restrained by the proposed 0.05 grams VOC per use limit. The 0.05 grams of VOC per use limit provides emission reductions equivalent to setting a 2.6 percent by weight limit including fragrance (or a 0.6 percent by weight limit with the fragrance exemption in section 94510(c)). Because the proposed limit already accounts for the fragrance, there is no need for the fragrance exemption in section 94510(c).

- f. **Issue:** Manufacturers will have to consider increasing the sheet sizes. This will result in less emissions reduction achieved. There will be a significant impact on the environment from increased solid waste and shipping-related energy and air emissions. (This comment is in reference to an earlier staff proposal for a percent by weight limit).

Response: Staff believes that the existing corporate environmental policies will not favor the option of increasing sheet size. In addition, staff's proposal for a grams of VOC per use limit, instead of a percent by weight limit, mitigates the potential for increases in sheet sizes.

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6. Floor Maintenance Product

Product Category Description:

The Floor Maintenance Product category consists of products that are labeled as Spray Buff products as well as products labeled as maintainers and restorers. Products

in this category are designed or labeled to restore, maintain, or enhance a previously applied floor finish. Spray Buff products are designed or labeled to be used in conjunction with a floor buffing machine and special pad. Floor maintainers or restorers are designed or labeled to be applied with a mop and burnished with a floor buffing machine. Though the application methods for these two types of products differ, their formulations are similar. This category does not include floor polish products, products designed solely for the purpose of cleaning, or products designed specifically for the use on marble floors.

Floor Maintenance Products are a previously unregulated category. Table VI-11 below summarizes the sales and emissions from Floor Maintenance Products based on the results of ARB's 2003 Survey (ARB, 2004a). Floor Maintenance Products have estimated VOC emissions of 194 pounds per day, or about 0.1 tons per day in California.

**Table VI-11
Floor Maintenance Product***

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
All Forms	98	3,540	194

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

As shown in Table VI-11, this category contains 98 products with sales of 3,540 pounds per day. Although not shown, the sales-weighted average VOC content is about 5 percent by weight.

Product Use and Marketing:

Floor Maintenance Products are primarily used by commercial/institutional users and are designed for use on finishes previously applied to resilient and non-resilient floors. These products are able to remove traffic damage, soils, and reduce maintenance costs by extending the time between topcoating and stripping the previous finish (Rohm and Haas, 2006). The process may take place in the presence of pedestrian traffic resulting in minimum floor down-time (Rohm and Haas, 2006).

Products labeled as Spray Buffs are applied to a clean and dry floor surface. The user or machine will spray the product in a small area of the floor, avoiding excess application or allowing the product to puddle. The final step is then to buff the product using a buffer or burnishing machine.

Products labeled as floor maintainers or restorers are usually applied to a clean and dry floor surface with a mop in a thin, even layer, avoiding using excess product or

allowing the product to puddle. The user allows the product to dry (usually about 20 minutes) before burnishing or buffing with a machine.

Floor Maintenance Products are sold to commercial and industrial establishments. They can be found at janitorial stores, the Internet, as well as through manufacturers' and distributors' sales representatives.

Product Formulation:

Floor Maintenance Products are primarily composed of water and polymer solids. Other ingredients include coalescent aids and other modifiers (such as levelers, plasticizers, viscosity modifiers, etc.) that optimize product properties. The coalescent aids are typically volatile glycol ethers that help the polymer solids form a smooth continuous coating over the floor surface.

Proposed VOC Limit and Compliance:

The proposed VOC limit for Floor Maintenance Products is 1 percent by weight, effective December 31, 2010. As shown in Table VI-12, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 142 pounds per day, or about 0.07 tons per day, by 2010. Table VI-12 also shows that 53 percent of the market currently complies with the proposed 1 percent VOC limit.

Table VI-12
Floor Maintenance Product Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2010 Emission Reductions (lbs/day)+
All Forms	1	57	53	140	142

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2010 (see Chapter IV, Emissions).

There are reformulation options available that make reductions in VOC content technologically and commercially feasible. We expect manufacturers of noncompliant products to reformulate similarly to the compliant products. We also expect the technology used to reformulate floor polish for resilient and non-resilient floors may be used to reformulate Floor Maintenance Products. A 1 percent VOC limit was set for Resilient and Non-Resilient Floor Polish products in 2006. Reformulation options that can be used to meet the proposed limit include the use of water, LVP-VOC hydrocarbon solvents, LVP-VOC glycol ethers, as well as non-VOC alternatives available for substitution.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2004a)
2. Rohm and Haas. Presentation to ARB staff. June 2006 (Rohm and Haas, 2006)

7. Floor Polish or Wax: Wood Floor Wax

Product Category Description:

Floor Polish or Wax is divided into three subcategories: products for Resilient Flooring Material, products for Nonresilient Flooring Material, and Wood Floor Wax. Floor Polish or Wax products for Resilient and Nonresilient floors were regulated as part of the 2006 Amendments. The proposal described here relates to Wood Floor Wax products only.

Wood Floor Wax products are designed or labeled for use solely on wood floors. These products are designed to polish, protect, wax, condition, protect, temporarily seal, or otherwise enhance floor surfaces by leaving a protective finish that is designed or labeled to be periodically replenished. This category does not include Floor Maintenance Products, Floor Wax Strippers, or coatings subject to architectural coatings regulations. Wood Floor Wax products that claim to “clean and wax” or “clean and polish” are Wood Cleaner products.

Floor Polish or Wax products were first regulated under Phase I of the Consumer Products Regulation adopted in October of 1990, and a description of these products is also included in the staff report for that rulemaking (ARB, 1990b). At that time, the Board adopted a 90 percent VOC limit for products used on wood floors, effective on January 1, 1994.

Table VI-13 below summarizes the sales and emissions reported for Wood Floor Wax products, based on the results of ARB’s 2003 Survey (ARB, 2004a). The data have been grown to the 2008 calendar year. Total category sales are about 136 pounds per day.

As shown in Table VI-13, Wood Floor Wax products have estimated VOC emissions of 112 pounds per day, or about 0.06 tons per day in California in 2008. Although not shown, the sales-weighted average VOC content is about 82 percent by weight.

Table VI-13
Floor Polish or Wax: Wood Floor Wax*

Product Form:	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
All Forms	7	136	112

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

Product Use and Marketing:

Wood Floor Wax is used by general consumers, as well as commercial and institutional customers. Commercial and institutional products account for the majority of reported products and total sales.

These products are historically designed to provide a temporary, water resistant seal to a finished or unfinished wood floor. Unfinished wood flooring material is becoming increasingly rare as evidenced by small sales in this category. Today they are being replaced with factory sealed wood flooring material. Generally anhydrous wax-based products (such as a paste wax) are used on unsealed wood floors, whereas a wax-based, but not necessarily anhydrous product is used on sealed wood floors. Because there is a potential for “side-bonding” or water damage if water-based products are used on an unsealed wood floor, anhydrous products are still needed (Owens, 2006).

Wood Floor Wax products are generally applied with a sponge or cloth to a dry floor, and are then rubbed into the wood in a circular motion and allowed to dry. Depending on the manufacturer recommendations, the final step may then be to buff the finish to a shine using a buffer or burnishing machine, or to polish by hand with a clean cloth.

Wood Floor Wax products are sold to household consumers, commercial, and industrial establishments. They can be found at janitorial stores, supermarkets, warehouse and hardware stores, and the Internet, as well as through manufacturers’ and distributors’ sales representatives.

Product Formulation:

Wood Floor Waxes typically contain a suspension of natural wax such as carnauba or montan or other polymer in a hydrocarbon solvent such as mineral spirits. A solid form of Wood Floor Wax is generally composed of approximately 70 percent solids (wax) and 30 percent hydrocarbon solvent or LVP-VOC solvent. A liquid form of wood floor wax is generally composed of a mixture of water, a polymer solid, and an LVP-VOC solvent.

Proposed VOC Limit and Compliance:

The proposed VOC limit for Wood Floor Wax products is 70 percent by weight, effective December 31, 2010. As shown in Table VI-2, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 24 pounds per day, or about 0.012 tons per day in 2010.

Table VI-14 does not show the number of complying products or complying marketshare due to data confidentiality.

Table VI-14
Floor Polish or Wax: Wood Floor Wax Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2010 Emission Reductions (lbs/day)+
All Forms	70	***	***	22	24

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2010 (see Chapter IV, Emissions).

Reformulation options for Wood Floor Wax products include the substitution of hydrocarbon solvents with LVP-VOC solvents. Manufacturers may also develop a polymer technology that requires less VOC solvent. A minimal number of product reformulations are anticipated, as the market for these products is small and is anticipated to continue to decrease.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2004a)
2. Air Resources Board. Proposed Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products – Technical Support Document. August, 1990. (ARB, 1990b)
3. Owens, Joseph M. Presentation to ARB staff. August, 2006. (Owens, 2006)

8. Glass Cleaner – aerosol

Product Category Description:

Glass Cleaners are specialty cleaning products designed primarily for cleaning surfaces made of glass such as windows, mirrors, glass tabletops, and computer screens. However, the Glass Cleaner category does not include products designed solely for the purpose of cleaning optical materials used in eyeglasses, photographic equipment, scientific equipment and photocopying machines. Products marketed as “glass and surface cleaner” are not included in this category; they are regulated as General Purpose Cleaner.

Glass Cleaners were first regulated under “Phase I” of the Consumer Products Regulation adopted in October of 1990, and a description of these products is also included in the staff report for that rulemaking (ARB, 1990b). At that time, the Board adopted a 12 percent VOC limit for these products which was effective on January 1, 1993. Although past regulatory actions resulted in significant emission reductions, we believe that technology now exists to further reduce VOC emissions from the aerosol product form. Therefore, we are proposing to amend the regulation to reduce the VOC content limit for aerosol Glass Cleaners to 10 percent by weight VOC.

Table VI-15 below summarizes the sales and emissions from aerosol Glass Cleaners based on the results of ARB’s 2003 Survey (ARB, 2004a). The data have been grown to the 2008 calendar year. Total category sales are about 6,087 pounds per day.

Table VI-15
Glass Cleaner – aerosol*

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
Aerosol	95	6087	663

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

Estimated VOC emissions are 663 pounds per day, or about 0.33 tons per day. Although not shown, the sales-weighted average VOC content for this category is about 11 percent.

Product Use and Marketing:

Aerosol Glass Cleaners are used by household, institutional and industrial users for cleaning surfaces made primarily of glass and may have additional claims for cleaning surfaces such as chrome and plastic which require a “non-streaking” cleaning performance – leaving no non-volatile residues which show up readily on such surfaces.

They are marketed towards automotive, household, office, institutional, professional and other specialty uses.

These products can be purchased through many sales outlets including grocery stores, discount stores, wholesalers, mass merchandisers, hardware stores, automotive parts stores, warehouse stores and home centers. These products are labeled primarily for use on glass. If the product makes a “multi-surface” claim on the front panel, it is categorized as a General Purpose Cleaner.

Product Formulation:

Glass Cleaners are typically formulated with a high water content. Short carbon chain alcohols (such as isopropyl alcohol or ethyl alcohol) and/or glycol ethers are used to dissolve oily soils. Trace amounts of surfactant are included to emulsify oily soils. The surfactant also creates a layer of foam which forms on the sprayed surface. This allows the product to cling to the surface making the cleaning agents more effective and preventing run-off while the user wipes the surface clean. Trace amounts of a suitable inorganic material prevent corrosion in the can. Fragrance imparts a pleasant odor into the air and contributes to the overall aesthetic of the product. It can also mask the solvent and ammonia odor, if present. Non-volatiles, also known as residuals, are left behind on the surface after the rest of the product evaporates and can contribute to streaking, and are, therefore, kept to a minimum in the formulation. All of the products reported in the 2003 Survey are propelled by hydrocarbon propellants, typically in the 4 to 5 percent by weight range.

Proposed VOC Limit and Compliance

The proposed VOC limit for aerosol Glass Cleaners is 10 percent by weight, effective December 31, 2012. As shown in Table VI-16, using adjusted 2012 emissions, the proposed limit will result in an estimated emission reduction of 65 pounds per day, or about 0.03 tons per day. Table VI-16 also shows that 37 percent of the market currently complies with the proposed 10 percent VOC limit.

Table VI-16
Glass Cleaner – aerosol Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2012 Emission Reductions (lbs/day)+
Aerosol	10	32	37	62	65

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey emissions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Survey emissions adjusted for complete market coverage and grown, by population, to 2012 (see Chapter IV, Emissions).

The proposed standard for aerosol Glass Cleaner was established after review of the 2003 survey data, consultation with industry representatives, review of available literature materials, and analysis of the technological and commercial feasibility of the standard.

As shown in Table VI-16, over a third of the market currently meets the proposed 10 percent VOC limit. These complying products are using a combination of alcohol and glycol ether solvents, and hydrocarbon propellant in order to reach the proposed 10 percent VOC level.

For most aerosol Glass Cleaners, the reformulation will involve replacing some of the VOC solvent and/or propellant with water. Many products at, or below, the 10 percent VOC level already claim to clean glass while leaving the surface streak-free. Besides products categorized as Glass Cleaner, there is a substantial market volume of products making equivalent claims in addition to cleaning claims for other hard surfaces.

Reformulated products, while effective, may have different attributes than the consumer is used to for some products. Staff believes this will require extensive test marketing before bringing the reformulated product to market. For these reasons, staff believes more time for compliance is warranted.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2004a)
2. Air Resources Board. Proposed Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products – Technical Support Document. August, 1990. (ARB, 1990b)

9. Motor Vehicle Wash

Product Category Description:

Motor Vehicle Wash means a product designed or labeled to wash, wax and shine, or wash and/or clean the exterior surfaces of motor vehicles. Motor Vehicle Wash includes, but is not limited to, products for use in commercial, fleet, hand, and “drive through” car washes, commercial truck washing or large vehicle washing stations, and vehicle dealers and repair shops, as well as products intended for household use. Motor Vehicle Wash does not include Bug and Tar Remover, Glass Cleaner, Engine Degreaser, Brake Cleaner, Tire or Wheel Cleaner, and products labeled exclusively for use on locomotives or aircraft.

Motor Vehicle Wash is a previously unregulated category. Table VI-17 below summarizes the sales and emissions from Motor Vehicle Wash based on the results of

ARB's 2003 Survey (ARB, 2004a). The data have been grown to the 2008 calendar year. Total category sales are about 53,680 pounds per day.

Table VI-17
Motor Vehicle Wash*

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
All Forms	366	53,680	752

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

Estimated VOC emissions are 752 pounds per day, or about 0.38 tons per day. Motor Vehicle Wash, while primarily marketed as liquid, can also be found in non-aerosol product forms such as solid, foam/mousse, mist/dispersed spray, and post-foaming gel. No aerosol products were reported in the 2003 Survey (ARB, 2004a). Although not shown, the sales-weighted average VOC content for this category is approximately 1 percent by weight.

Product Use and Marketing:

Motor Vehicle Wash products are sold to household or “do-it-yourself” consumers, commercial, and industrial establishments. They are to be used on the exterior surfaces of motor vehicles such as automobiles, vans, sport utility vehicles (SUV), motorcycles, commercial trucks and trailers, noncommercial trucks, service vehicles, and recreational vehicles. These products are used to safely remove dirt, grime, and other road soils from a variety of material surfaces including, but not limited to, painted metal, vinyl, and metallic trim. In some instances, the product cleans the vehicle and leaves a shine or wax finish in a single step. These one-step products are unlike wax products, which must be applied separately to a clean vehicle surface. Both “wash and shine” and “wash and wax” products are able to be applied to a dirty vehicle surface.

For the “do-it-yourself” consumers, Motor Vehicle Wash products are available in, but not limited to, retail outlets such as supermarkets, diversified pharmacies, home improvement stores, auto supply stores, super stores, and specialty stores. Auto dealers, repair shops, catalog sales, and the Internet are additional marketing locations. For commercial and industrial businesses, products are available from manufacturers and/or distributors, warehouses, as well as the Internet and retail outlets.

The majority of Motor Vehicle Wash products are sold as liquid concentrates and must be diluted prior to use. A typical dilution would be one ounce of Motor Vehicle Wash to one gallon of clean water. Directions for product use indicate that the water should be cool, and the solution should be applied to a cool surface with soft material. The directions also often direct consumers to wash vehicles from the top down and

rinse after the wash is applied. Using a terry cloth towel or other material such as a chamois to remove water is recommended.

Concentrated Motor Vehicle Wash products that are used in commercial establishments, such as car wash or auto detailing businesses, may be used in proportioning units through which the concentrate passes in order to achieve the proper dilution ratio. An example of a commercial dilution ratio can be 1 part product to 300 to 500 parts water. After the wash cycle, vehicles are rinsed. Depending on the properties of the concentrate or other additives, vehicles may air dry or need to be dried either mechanically or by hand to avoid spotting.

Product Formulation:

Motor Vehicle Wash products are primarily very near-zero VOC water-based formulations. Surfactants are the active ingredient of the products in this category. These surfactants are typically detergents and comprise the LVP-VOC portion of the product. Typical formulations include water and a small amount of LVP-VOCs, or water and a small amount of inorganics, or water and both LVP-VOCs and inorganics. The VOCs used in this category include small amounts of 2-butoxyethanol and isopropyl alcohol.

Proposed VOC Limit and Compliance:

The proposed limit for Motor Vehicle Wash is 0.2 percent VOC by weight, effective December 31, 2010. The proposed limit is applicable to both ready-to-use and dilutable products. The limit applies to diluted products after the minimum dilution is made. As shown in Table VI-18, using adjusted 2010 emissions, the proposed limit will result in an estimated reduction of 284 pounds per day, or about 0.14 tons per day. Table VI-18 also shows that 89 percent of the market currently complies with the proposed 0.2 percent VOC limit.

Table VI-18
Motor Vehicle Wash Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2010 Emission Reductions (lbs/day)+
All Forms	0.2	311	89	276	284

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2010 (see Chapter IV, Emissions).

Reformulation options that could be used by manufacturers to meet the proposed limit include the use of water and LVP-VOC hydrocarbon solvents; water and

inorganics; or water in combination with both LVP-VOC solvents and inorganics. Because there are many viable non-VOC alternatives available for substitution, we believe the proposed limit is commercially and technologically feasible.

Issues:

- a. **Issue:** Wash-and-wax should be removed from the definition as it is a different product “type” from wash and cleaner.

Response: Staff maintains that motor vehicle “wash and wax” products and “wash and shine” products should be included in the definition because these products are marketed as vehicle washes and are formulated similarly. Both Motor Vehicle Wash ingredients and wax or shine ingredients are combined in the product and labeled to be applied to vehicles in the same manner as other Motor Vehicle Wash products. They are usually applied to dirty surfaces, unlike waxes which must be applied to clean surfaces. Retail outlets from supermarkets to superstores and auto supply stores, for example, stock and feature “wash and wax” and “wash and shine” products with other Motor Vehicle Wash products and not with vehicle wax products.

- b. **Issue:** Industry only assumed one product “type” (i.e., wash only products) when responding to the 2003 Consumer Products Survey and the data may not be available to support meeting the criteria for this new category.

Response: Industry did not assume only one motor vehicle wash and cleaner product type when responding to the 2003 Consumer Products Survey. Twenty-five companies responded with 38 products that are either wash and wax or wash and shine which they identified as belonging in the vehicle wash category along with the other 300-plus products that were reported in the category. After considering dilution ratios, most of these products already comply with the proposed 0.2 percent VOC by weight limit.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2004a)

10. Multi-purpose Lubricant

Product Category Description:

Multi-purpose Lubricants are lubricant products designed for general purpose lubrication, or lubricants labeled for use in a wide variety of applications. This category includes products that are labeled for household use and for institutional and industrial use (for example, use by mechanics, professional contractors, and manufacturing

facilities). This category includes products that are simply labeled as “lubricants;” multi-functional products that provide light duty lubrication; products labeled as aerosol spray greases; and liquid or aerosol products containing heavier base oils. This category includes multi-functional Multi-purpose Lubricants, which may also make claims to function as demoisurants, penetrants, and rust preventatives.

This category does not include specialty lubricant products, such as products labeled only for use on chains, even if the label specifies use on different types of chains. As defined in the Consumer Products Regulation, Multi-purpose Dry Lubricants, Penetrants, and Silicone-based Multi-purpose Lubricants are excluded from the Multi-purpose Lubricant category. The Multi-purpose Lubricant category also excludes lubricant products that are (1) sold exclusively to establishments which manufacture or construct goods or commodities, and are (2) labeled “not for retail sale.” Automotive power steering fluids, lubricant products for use inside power generating motors, engines, and turbines, and their associated power-transfer gearboxes, two cycle oils or other products designed to be added to fuels, and products for use on the human body or animals are excluded from this category as well. Multi-purpose Lubricant products that are marketed in solid and semisolid-forms, as defined in the Consumer Products Regulation, are excluded from this category.

Multi-purpose Lubricants were first regulated under “Midterm Measures I” of the Consumer Products Regulation approved in July of 1997, and a description of these products is also included in the staff report for that rulemaking (ARB, 1997b). At that time, the Board adopted a 50 percent by weight VOC limit for these products which became effective on January 1, 2003.

Table VI-19 below summarizes the sales and emissions from Multi-purpose Lubricants based on the results of ARB’s 2003 Survey (ARB, 2004a). The data have been grown to the 2008 calendar year. Total category sales are about 16,337 pounds per day.

Table VI-19
Multi-purpose Lubricant*

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
Aerosol	146	11,568	5,784
Liquid	30	4,769	2,384
Total	176	16,337	8,168

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a); Includes products containing exempt chlorinated solvents.

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

Estimated 2008 VOC emissions for Multi-purpose Lubricants are 8,168 pounds per day, or about 4.08 tons per day in California. Table VI-19 shows the lubricant products separated into aerosol and liquid forms, with the aerosol form dominating the market in both sales and emissions. According to our data, the sales-weighted average VOC content for this category is about 48 percent by weight.

Product Use and Marketing:

Multi-purpose Lubricants are used by household, institutional, and industrial users. Household consumers use multi-purpose lubricants on a variety of objects, including door hinges, bicycle chains, garage door tracks, window tracks, camping and sporting equipment, gardening tools, locks and firearms. Institutional and industrial consumers use Multi-purpose Lubricant products on the above mentioned items, as well as on more specialized equipment such as conveyors, open gears, electrical equipment, nuts, bolts, cables, and machinery.

Some Multi-purpose Lubricants are designed to deposit a heavier coating that provides lubricity under higher loads. These products include aerosol spray greases, such as “white lithium grease;” liquid or aerosol lubricants containing heavier base oils; and lubricants that provide extra protection against corrosion.

The Multi-purpose Lubricant category includes multi-functional products that are typically designed to provide a light lubricant film that penetrates surfaces, displaces water and inhibits rust and corrosion (ARB, 2004a). They are more often used for light duty lubrication, or for use as a penetrant, demineralizer, or for corrosion prevention. Typical applications include lubrication of locks or sliding mechanisms.

Multi-purpose Lubricants for household use are sold in various retail venues such as hardware stores, supermarkets, do-it-yourself home building supply stores, on the Internet, and everywhere automotive supplies are sold. Products may also be sold to institutional users through distributors.

Product Formulation:

Multi-purpose Lubricants provide lubrication through use of base oils. These base oils are typically various grades of petroleum oils or greases. In some cases, synthetic oils are used. The balance of the product is usually a hydrocarbon solvent which may be a VOC, a LVP-VOC, or a mixture of VOC and LVP-VOC hydrocarbon solvents. A small number of products use chlorinated solvents. The propellant, in aerosol products, is either a liquefied petroleum gas or carbon dioxide. After the product is sprayed, the solvent and propellant evaporate away, leaving a coating of oil or grease. Liquid products are typically comprised of pure base oils, or base oils thinned in any of the solvents used in aerosol products.

The oils or greases used in aerosol Multi-purpose Lubricants constitute approximately 15 to 40 percent of the formulation by weight (ARB, 2004a). The base

oils, are generally chosen based on their viscosity and typically consist of highly refined aliphatic or naphthenic hydrocarbon mixtures. Some Multi-purpose Lubricants, such as aerosol spray greases, use synthetic oils in their formulations (ARB, 2004a).

The solvents used in Multi-purpose Lubricants comprise 35 to 90 percent of aerosol formulations. Various grades of petroleum distillates are used. VOC solvents used include heptanes, hexanes, toluene, trichloroethylene, and glycol ethers. LVP-VOC hydrocarbon solvents are also used.

The propellants used in aerosol Multi-purpose Lubricants are either liquefied petroleum gases (propane, isobutane, normal butane), or carbon dioxide. Liquefied petroleum gases constitute approximately 20 to 30 percent of the product weight, compared to 2 to 3 percent when carbon dioxide is used.

Specialized extreme pressure additives may also be added in small amounts to Multi-purpose Lubricant formulations to enhance the ability of the base oil to protect surfaces under high load conditions. These specialized additives include graphite, Teflon (polytetrafluoroethylene), and “moly” (molybdenum disulfide). Multi-purpose Lubricants that contain these additives are not considered Multi-purpose Dry Lubricants.

Multi-purpose Dry Lubricants provide lubricity solely through use of graphite, molybdenum disulfide, or polytetrafluoroethylene or closely related fluoropolymer. Multi-purpose Dry Lubricants do not contain oils. The proposed amendments include a modification to the Multi-purpose Dry Lubricant definition. The proposed modification clarifies that lubricity is provided solely by these compounds. The modification is intended to clearly distinguish these products from Multi-purpose Lubricants.

Corrosion inhibitors may also be added to Multi-purpose Lubricant formulations to prevent corrosion on the coated surfaces. These compounds generally make up a small percentage of the overall lubricant formulation and they may consist of organic acids, esters, amino acid derivatives, and various alkaline compounds.

Aerosol spray greases (i.e. white lithium grease, or red grease) are Multi-purpose Lubricants made up of oils which are thickened with a “metal soap,” such as lithium hydroxystearate) or a gelling agent, such as silica or clay.

Proposed VOC Limit and Compliance:

We are proposing two tiers of VOC limits for Multi-purpose Lubricants. The first tier VOC limit for Multi-purpose Lubricants is 25 percent by weight for both aerosol and liquid forms, effective December 31, 2013. As shown in Table VI-20, using adjusted 2003 emissions, the proposed limit will result in an estimated VOC emission reduction of 4,084 pounds per day, or about 2 tons per day, in 2013. A technology-forcing second tier VOC limit of 10 percent VOC by weight, effective December 31, 2015, is also proposed. As shown in Table VI-20, the 10 percent limit would reduce emissions by

2,545 pounds per day, or about 1.3 tons per day. When fully effective, these two limits would reduce emissions from Multi-purpose Lubricants by about 3.3 tons per day.

Table VI-20 also shows that 38 products, representing approximately 4 percent of the total Multi-purpose Lubricant market, currently comply with the proposed 25 percent VOC limit. Table VI-20 also shows that 22 products, representing 3 percent of the market currently comply with the proposed 10 percent limit. Only those products complying without the use of methylene chloride, perchloroethylene, and trichloroethylene, are included in the complying market share data. The complying products include both aerosol and liquid Multi-purpose Lubricants for household, commercial and institutional use.

Table VI-20
Multi-purpose Lubricant Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	Emission Reductions (lbs/day)+
Aerosol	25	27	3	2,748	2,924
	10	11	2	1,677	1,827
Liquid	25	11	6	1,090	1,160
	10	11	6	659	718
Total	25	38	4	3,838	4,084
	10	22	3	2,336	2,545

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2013 for the 25% VOC limit; and to 2015 for the 10% VOC limit (see Chapter IV, Emissions).

The proposed VOC limits are designed to restrict the use of VOCs in Multi-purpose Lubricant formulations. Reformulation options include adding more base oil to the formulation; replacing some of the VOC solvents with LVP-VOC solvents; and using carbon dioxide as an alternative to liquefied gas hydrocarbon propellants.

We believe that the small complying market shares demonstrate that the VOC limits are feasible, but challenging - especially for aerosols. Therefore, staff is proposing extended effective dates for the limits. As proposed, the compliance date to meet the 25 percent limit is December 31, 2013. The 10 percent limit is proposed to become effective on December 31, 2015. The second tier technology-forcing limit of 10 percent is designed to encourage manufacturers to explore emerging technologies. Staff's research indicates that use of materials such as soy-based products provide a partial path forward. However, maintaining many other attributes of Multi-purpose Lubricants will require extensive research and development.

While the reformulation options may appear straight-forward, maintaining existing lubricity and evaporative characteristics will be challenging. As mentioned earlier, Multi-purpose Lubricants may also function as demulsurants, penetrants, and rust inhibitors. Research to find additives for corrosion protection and to maintain the products' penetrating ability will be required. Utilizing emerging technologies in an aerosol product also presents challenges. Many reformulated products, while effective, may have different attributes than the consumer is used to. Staff believes this will lead to extensive test marketing before bringing the reformulated products to the market. For these reasons, staff believes additional time is needed to successfully reformulate and bring products into the market.

The Institute for Research and Technical Assistance (IRTA) conducted lubricant research in 2004 and 2006 with a focus on finding alternatives to high VOC petroleum-based and chlorinated oils. The alternatives that IRTA tested, and demonstrated in the industrial setting during the two projects, were water-based and vegetable-based products. Some businesses have been using these products as cutting oils or for honing, machining, or stamping (IRTA, 2006; IRTA, 2004). These operations are not typical consumer uses. We also note the products used were not aerosols, which household consumers prefer. Nevertheless, we believe, given more time, that Multi-purpose Lubricant products, including aerosols, could be formulated to lower VOC levels.

While staff believes that technologies are progressing to allow for Multi-purpose Lubricants at VOC content levels of 25 percent and, in the future 10 percent, staff intends to work with industry to assess progress as compliance dates near. To that end, staff is proposing two technology assessments. To ensure that manufacturers are on track, and that technology advances as expected, staff believes that manufacturers should demonstrate their progress toward meeting these limits.

As proposed in new subsection 94513(f) Multi-purpose Lubricant manufacturers would need to supply detailed written updates on their research and development efforts undertaken to achieve compliance with the VOC limits. The reports would include sales and formulation data for products, as well as detailed information on the raw materials evaluated for use, maximum incremental reactivity (MIR) values for any VOC or LVP-VOC used or evaluated, the function of the raw material evaluated, testing protocols used, the results of the testing, the hardware evaluated, and the cost of reformulation efforts. The first report would be due on March 31, 2012, and would provide data for the 2011 calendar year. A second report would be due on March 31, 2014, and would provide data for the 2013 calendar year.

Because our data show compliance can be achieved without the use of methylene chloride, perchloroethylene, and trichloroethylene we are proposing to prohibit the use of these TACs from the Multi-purpose Lubricant category effective December 31, 2010. Methylene chloride and perchloroethylene are exempt VOC solvents. Therefore, without the prohibition, their use could increase as products reformulate to comply. Trichloroethylene is a VOC, and its use would likely decrease to

meet the proposed limit. However, other solvents are available that make its use unnecessary. Prohibiting these three TACs will lead to approximately 0.01 tons per day of toxic compound emission reductions from this category. The health effects associated with exposure to perchloroethylene, methylene chloride and trichloroethylene, are summarized in Chapter VIII, Environmental Impacts.

Issues:

- a. **Issue:** This limit should be set at 10 percent or lower based on findings in the Institute for Research and Technical Assistance (IRTA) lubricant research summary.

Response: ARB staff agrees, but believes that additional time is necessary to successfully reformulate complying products. Staff is proposing that Multi-purpose Lubricants meet a 10 percent by weight VOC limit effective December 31, 2015. We believe that lubricant research conducted by IRTA is useful data for manufacturers to evaluate as they develop complying products. However, there are some limitations. Staff reviewed the lubricant studies conducted by IRTA in 2004 and 2006 (IRTA, 2006; IRTA, 2004). It is unclear whether the products tested would work well in various household consumer applications. Typical household consumers use multi-purpose lubricants for a host of lubrication needs, as well as for penetration, water displacement, and rust inhibition. IRTA studies focused on commercial manufacturing and repair operations with specific lubricating needs. Additionally, IRTA did not test any aerosol lubricant products. Our data show that consumers prefer aerosol products for their general lubrication needs.

- b. **Issue:** We believe it may be technologically and commercially feasible to reformulate Multi-Purpose Lubricants to a 25 percent VOC limit by December 31, 2014. However, the Automotive Specialty Products Association (ASPA) asserts that the ARB must commit to conducting a thorough assessment for this product category in 2010, 2012 and 2013 to determine the commercial and technological feasibility of the 25 percent VOC limit, if requested by our industry.

Response: Staff agrees in part. We have evaluated technology and are proposing that products meet a 25 percent VOC limit by December 31, 2013, and a technology-forcing limit of 10 percent by December 31, 2015. We also agree that technology reviews are appropriate, and are proposing two as described earlier.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2004a)

2. Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation: Midterm Measures I. June 6, 1997. (ARB, 1997b)
3. Institute for Research and Technical Assistance. Assessment, Development and Demonstration of Alternatives to VOC-emitting Lubricants, Vanishing Oils and Rust Inhibitors. August, 2006. (IRTA, 2006)
4. Institute for Research and Technical Assistance. Alternatives to VOC Emitting Petroleum Based Lubricants and Chlorinated Paraffin Lubricants: Minimizing the Health and Environmental Consequences. November, 2004. (IRTA, 2004)

11. Odor Eliminator/Remover

Product Category Description:

Odor Eliminator/Remover means a product that is designed or labeled to be applied exclusively to hard surfaces to inhibit the ability of soils to create malodors, or functions to entrap, encapsulate, neutralize, convert or eliminate malodor molecules. Odor Eliminator/Remover does not include products designed or labeled for use in cleaning soils from hard surfaces, laundering, softening, de-wrinkling or cleaning fabrics, or dishwashing, or products that are defined as Air Freshener, Bathroom and Tile Cleaner, Carpet/Upholstery Cleaner, Fabric Refresher, General Purpose Cleaner, Toilet/Urinal Care Product, Disinfectant, or Sanitizer. Odor Eliminator/Remover is used in household, automotive, institutional and commercial settings to counteract unpleasant odors. These products may employ bacterial cultures, enzymes or anti-bacterial chemical active ingredients to counteract odor causing substances. Use of Odor Eliminator/Remover, Air Fresheners and Fabric Refreshers may result in similar outcomes such as freshening air or removing odors. Odor Eliminators/Removers are distinguished from Air Fresheners, which are released directly to the air, and Fabric Refreshers, which are applied to fabric or other soft surfaces.

Odor Eliminators/Removers are a previously unregulated category. Table VI-21 below summarizes the sales and emissions from Odor Eliminator/Remover based on the results of ARB's 2003 Survey (ARB, 2004a). Category sales are 7,034 pounds per day, or about 3.5 tons per day, adjusted for complete market coverage and grown by population, to 2008.

**Table VI-21
Odor Eliminator/Remover***

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
Aerosol	< 5	***	***
Liquid	184	7034	247
Total	> 184	***	***

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

*** Data not shown due to confidentiality.

Estimated VOC emissions (grown, by population, to 2008) are 247 pounds per day, or about 0.12 tons per day. Because there were less than five aerosol products reported in the survey, the sales data are not shown to protect data confidentiality. The sales-weighted average VOC content for liquid products as packaged is 3.5 percent and 2.2 percent as diluted.

Product Use and Marketing:

Odor Eliminator/Remover products are used on hard surfaces in household, automotive, institutional, and commercial settings to eliminate, neutralize, remove, encapsulate, inhibit, control, destroy and/or counteract odor. The household products are generally available through retailers, while the institutional and commercial products are sold via wholesalers through distribution channels or direct sales.

Household Odor Eliminators/Removers are used on hard surfaces to treat bathroom and kitchen odors, closets, basements, floor mats, drawers, odors from ventilation systems, pet odors, cat litter odors, garbage odors, smoke, and odors caused by moisture. These products are generally applied as needed with the user controlling the amount of product used (ARB, 2004a).

Automotive Odor Eliminator/Remover products are used to eliminate musty odors due to mildew formation in the persistently damp surfaces of automobile air conditioning vents and ducts (ARB, 2004a).

Odor Eliminators/Removers used on hard surfaces in institutional and commercial settings control odors from bathrooms, laundry areas, food preparation areas and specific industries such as diaper services (ARB, 2004a). Odor Eliminator/Remover products used in commercial settings are used to control garbage odors from trash compactors/dumpsters; mold and mildew and waste in bathrooms; body odor and mold and mildew in locker rooms; odors in air ducts and pipelines; odors in transportation settings such as airplanes and buses and odors in remediation services (ARB, 2004a).

Product Formulation:

The VOC content of products in the liquid category ranges from 0 to about 53 percent by weight as diluted. Fragrance oils constitute from 0 to 53 percent of the product's weight as diluted. They produce the product's scent. Although fragrance oils are VOCs by definition, the Consumer Products Regulation allows an exemption of up to two percent by weight of the product, as long as the vapor pressure of the fragrance and other functional components of the fragrance are less than 2 millimeters mercury (mm Hg) at 20 degrees Celsius.

Emulsifiers are used in the product formulation to aid the mixing of the fragrance oil in the water phase by creating a homogeneous liquid. Because the desired emulsions are oil-in-water, surfactants with higher hydrophilic-lipophilic balance values are more suitable in oil-in-water formulations.

Active ingredients include bacterial cultures, enzymes, or chemical agents which are used to inactivate odor causing molecules.

Proposed VOC Limit and Compliance:

The proposed VOC limit for liquid Odor Eliminator/Remover is 6 percent by weight, effective December 31, 2010. As shown in Table VI-22, using adjusted 2010 emissions, the proposed limits will result in an estimated emission reduction of 50 pounds per day, or about 0.03 tons per day. Table VI-22 also shows that 82 percent of the market currently complies with the proposed 6 percent VOC limit for liquid Odor Eliminator/Remover products. The proposed limit for aerosol Odor Eliminator/Remover is 25 percent VOC by weight. The aerosol products reported in the survey comply with the 25 percent limit.

Table VI-22
Odor Eliminator/Remover Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2010 Emission Reductions (lbs/day)+
Aerosol	25	< 5	100	0	0
Liquid	6	154	82	49	50
Total	-----	> 154	-----	49	50

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2010 (see Chapter IV, Emissions).

Generally, reformulation to the 6 percent VOC level will involve replacing some of the VOC solvent and/or fragrance with water keeping the active “odor eliminating” ingredient constant, or possibly increasing it as appropriate.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2004a)

12. Penetrant

Product Category Description:

Penetrants are lubricant products designed and labeled primarily to loosen metal parts that have bonded together due to rusting, oxidation, or other causes. This category does not include Multi-purpose Lubricants that claim to have penetrating qualities, but are not labeled primarily to loosen bonded parts. Penetrants that are (1) sold exclusively to establishments which manufacture or construct goods or commodities, and are (2) labeled “not for retail sale” are also excluded from this category.

Penetrants were first regulated under “Midterm Measures I” of the Consumer Products Regulation approved in July of 1997, and a description of these products is also included in the staff report for that rulemaking (ARB, 1997b). At that time, the Board adopted a 50 percent by weight VOC limit for these products, which became effective on January 1, 2003.

Table VI-23 below summarizes the sales and emissions from Penetrants based on the results of ARB’s 2003 Survey. The data have been grown to the 2008 calendar year. Total category sales are about 2,021 pounds per day.

**Table VI-23
Penetrant***

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
Aerosol	68	1,709	714
Liquid	16	312	79
Total	84	2,021	793

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a); Includes products containing chlorinated compounds.

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

Estimated 2008 VOC emissions for Penetrants are 793 pounds per day, or about 0.4 tons per day, in California. Table VI-23 shows the Penetrant products separated into aerosol and liquid forms, with the aerosol form dominating the market in both sales and emissions. According to our data, the sales-weighted average for this category is 38 percent VOC by weight.

Product Use and Marketing:

Penetrants are used by household, institutional and industrial users to loosen immovable parts such as rusted pipe fittings, automotive parts, and nuts and bolts. Some product labels instruct the user to tap extremely rusted parts after spraying to set up vibrations that assist in the penetration of the product (ARB, 2004a). Some Penetrants claim to have lubricating properties and many claim corrosion protection (ARB, 2004a).

Penetrants are sold in hardware stores, automotive parts stores, by specialty retailers, by mass merchandisers, and on the Internet. Penetrants are also sold to industrial or institutional users through distributors that serve these customers, or directly to large customers.

Product Formulation:

Penetrant formulations are similar to Multi-purpose Lubricants in that they contain lubricating oils, solvents, and, in some cases, extreme pressure additives, such as a fluoropolymer, or molybdenum disulfide. Penetrants are typically comprised of light petroleum oils that vary in range from 10 to 40 percent. Liquefied petroleum gas, carbon dioxide, or nitrogen gas act as propellants for the aerosol products. The balance of the product formulation is comprised of various hydrocarbon solvents. A few Penetrants contain chlorinated solvents, such as methylene chloride, perchloroethylene, and trichloroethylene. Some contain synthetic oils; vegetable oils; and others utilize water-based formulations (ARB, 2004a).

Penetrants contain a balance of solvents and oils in order to achieve both low viscosity and low surface tension. According to the 2003 Survey, some of the VOC solvents used in Penetrants include various grades of petroleum distillates such as kerosene (VOC portion), mineral spirits and trichloroethylene. A variety of LVP-VOC solvents used in Penetrants include hydrocarbon solvents and fatty acid methyl esters. Water is also used.

Proposed VOC Limit and Compliance:

The proposed VOC limit for Penetrants is 25 percent by weight for both aerosol and liquid forms, effective December 31, 2013. As shown in Table VI-24, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 305 pounds per day, or about 0.15 tons per day, in 2013.

Table VI-24 also shows that 14 products, representing about 30 percent of the total Penetrant market share, currently comply with the proposed 25 percent VOC limit. Only those products complying without the use of methylene chloride, perchloroethylene, and trichloroethylene are included in the complying market share data. The complying products include both aerosol and liquid Penetrants for household, commercial and institutional use.

**Table VI-24
Penetrant Proposal ***

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emissions Reductions (lbs/day)**	2013 Emissions Reductions (lbs/day)+
Aerosol	25	9	28	255	271
Liquid	25	5	36	32	34
Total		14	30	287	305

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2012 (see Chapter IV, Emissions).

Penetrants that already comply with the proposed VOC limit are using a combination of LVP-VOC solvents, VOC solvents, oils, and various additives. Reformulation options include adding more oil to the formulation; replacing some of the VOC solvents with LVP-VOC solvents, or water; and using non-VOC alternatives to liquefied gas propellants, such as carbon dioxide. Reformulation may also require use of less viscous oils. Different solvents may be used to reduce the overall viscosity of some Penetrant formulations.

Because Penetrants are closely related to Multi-purpose Lubricants in formulation and their uses, the VOC limits and effective dates for these two categories have historically tracked. For this reason, the reformulation efforts for Penetrants are similar to Multi-purpose Lubricants in that research to find the correct balance of oils, solvents and additives without sacrificing the products' penetrating ability will be required. Therefore, the proposed effective date for the VOC limit for Penetrants is December 31, 2013.

While staff believes that technologies are progressing to allow for Penetrant products at a VOC content level of 25 percent staff intends to work with industry to assess progress as the compliance date nears. To that end, staff is proposing a technology assessment. To ensure that manufacturers are on track, and that technology advances as expected, staff believes that manufacturers should demonstrate their progress toward meeting the limit.

As proposed in new subsection 94513(f) Penetrant product manufacturers would need to supply detailed written updates on their research and development efforts undertaken to achieve compliance with the VOC limits. The reports would include sales and formulation data for products, as well as detailed information on the raw materials evaluated for use, MIR values for any VOC or LVP-VOC used or evaluated, the function of the raw material evaluated, testing protocols used, the results of the testing, the hardware evaluated, and the cost of reformulation efforts. The report would be due on March 31, 2012, and would provide data for the 2011 calendar year. Should technical or commercial issues arise, or if it appears reductions could occur within a shorter timeframe, staff would develop appropriate measures to ensure air quality benefits occur as soon as possible.

Because our data show compliance can be achieved without the use of methylene chloride, perchloroethylene, and trichloroethylene, we are proposing to prohibit the use of these TACs from the Penetrant category, effective December 31, 2010. Methylene chloride and perchloroethylene are exempt VOC solvents. Therefore, without the prohibition, their use could increase as products reformulate to comply. Trichloroethylene is a VOC, and its use would likely decrease to meet the proposed limit. However, other solvents are available that make its use unnecessary. Prohibiting these three TACs will lead to approximately 0.01 tons per day of toxic compound emission reductions from this category. The health effects associated with exposure to perchloroethylene, methylene chloride and trichloroethylene, are summarized in Chapter VIII, Environmental Impacts.

We have received information that suggests usage of non-flammable solvents in Penetrants is necessary in situations where Penetrants are used on energized equipment, near heat, flame, or other ignition sources. Staff agrees. Applying Penetrants to energized equipment may pose a safety risk. However, at the present time, use of chlorinated solvents is the only option for these applications.

Therefore, because of toxicity concerns, we are proposing to prohibit the use of perchloroethylene, methylene chloride, and trichloroethylene in Penetrants. However, we believe there is a small niche use for non-flammable products. Therefore, we are also proposing that Penetrants labeled as non-flammable and for use on energized equipment not be subject to the prohibition. To account for this specialized use, but to restrict the use of TACs to the extent possible, we are proposing that to qualify for the exemption from the toxic prohibition, Penetrants would have to include on the product's Principal Display Panel: "Non-flammable and only for use where equipment is energized." This proposal is set forth in new section 94509(q) of the Consumer Products Regulation.

Issues:

- a. **Issue:** This limit should be set at 10 percent or lower based on findings in the Institute for Research and Technical Assistance (IRTA) lubricant research summary.

Response: ARB staff disagrees. Staff reviewed the studies conducted by IRTA in 2004 and 2006 (IRTA, 2006; IRTA, 2004). The focus was on lubrication rather than penetration, therefore it is unclear whether the products tested would work well in various penetrant applications. However, as noted above, we are proposing a technology review in 2012 to assess progress and to determine if future further VOC reductions are feasible.

- b. **Issue:** We believe it may be technologically and commercially feasible to reformulate Penetrants to a 25 percent VOC limit by December 31, 2014. However, Automotive Specialty Products Association (ASPA) asserts that the ARB must commit to conducting a thorough assessment for this product category in 2010, 2012 and 2013 to determine the commercial and technological feasibility of the 25 percent VOC limit, if requested by our industry.

Response: Staff agrees in part. We have evaluated technology and are proposing that products meet the 25 percent VOC limit by December 31, 2013. We also agree that a technology review is appropriate, and are proposing one in 2012 as described earlier.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2004a)
2. Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation: Midterm Measures I. June 6, 1997. (ARB, 1997b)
3. Institute for Research and Technical Assistance. Assessment, Development and Demonstration of Alternatives to VOC-emitting Lubricants, Vanishing Oils and Rust Inhibitors. August, 2006. (IRTA, 2006)
4. Institute for Research and Technical Assistance. Alternatives to VOC Emitting Petroleum Based Lubricants and Chlorinated Paraffin Lubricants: Minimizing the Health and Environmental Consequences. November, 2004. (IRTA, 2004)

13. Personal Fragrance Product (products with 20 percent or less fragrance)

Product Category Description:

Personal Fragrance Product is currently defined as any product which is applied to the human body or clothing for the primary purpose of adding a scent or masking a malodor, including cologne, perfume, aftershave, and toilet water. Personal Fragrance Product does not include: (A) Deodorant, as defined in section 94501(d);

(B) medicated products designed primarily to alleviate fungal or bacterial growth on feet or other areas of the body; (C) mouthwashes, breath fresheners and deodorizers; (D) lotions, moisturizers, powders or other skin care products used primarily to alleviate skin conditions such as dryness and irritations; (E) products designed exclusively for use on human genitalia; (F) soaps, shampoos, and products primarily used to clean the human body; and (G) fragrance products designed to be used exclusively on non-human animals.

Staff is proposing to add clarifying language to the definition to indicate that Personal Fragrance Product includes, but is not limited to, lotions, powders, body mists, and body sprays.

Personal Fragrance Products were regulated under “Phase II” of the Consumer Products Regulation adopted in January of 1992, and a description of these products is also included in the staff report for that rulemaking (ARB, 1991a). However, instead of the product forms and standards described in that staff report, the Board divided the category into two subcategories, based on fragrance content, and adopted two tiers of VOC limits for each subcategory. Products with 20 percent or less fragrance were required to meet a VOC limit of 80 percent by weight, effective in 1995. A future lower limit of 75 percent by weight became effective in 1999. Products with more than 20 percent fragrance were required to meet a VOC limit of 70 percent by weight, effective in 1995. A lower limit of 65 percent became effective in 1999 (ARB, 1992).

However, an exemption from compliance with the initial VOC limit was adopted for existing products, and products “in development” on or before April 1, 1992, provided that such products were registered with ARB prior to July 1, 1993, and were sold in California before January 1, 1994. The regulation was further amended to specify (section 94510(l)) that the January 1, 1999 VOC limits do not apply to products which were sold in California prior to January 1, 1999 (ARB, 2007a). The overall effect of these two exemptions (“Grandfather” clauses) has meant that products in existence prior to 1992 were not reformulated to comply with VOC limits, and products subject to the 1995 first tier limit did not have to reformulate to meet the second tier 1999 VOC limits. Only products introduced after 1999 have been required to meet the second tier limits (ARB, 1992).

In addition, section 94510(j) of the Consumer Product Regulation specifies that the VOC standards specified in section 94509(a) do not apply to any VOC which is a fragrance in a Personal Fragrance Product (ARB, 2007a).

The Personal Fragrance Product category (products with 20 percent or less fragrance) is one of the larger emissions sources within the personal fragrance category. The proposal for this rulemaking affects only those Personal Fragrance Products with 20 percent or less fragrance. Table VI-25 below summarizes the sales and emissions from Personal Fragrance Products with 20 percent or less fragrance, based on the results of ARB’s 2003 Survey (ARB, 2004a). The data have been grown to the 2008 calendar year. Total category sales are about 26,905 pounds per day.

Table VI-25
Personal Fragrance Product (products with 20 percent or less fragrance)*

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
All Forms	1101	26,905	21,809

* Based on 2003 Consumer and Commercial Products Survey. (ARB, 2004a)

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

This category includes all product forms and includes, but is not limited to, colognes, perfumes, aftershaves, toilet waters, lotions, powders, body mists, and body sprays. Personal Fragrance Product (products with 20 percent or less fragrance) have estimated VOC emissions of 21,809 pounds per day, or about 10.9 tons per day, in California. Although not shown in Table VI-25, the sales-weighted average VOC content for this category is about 81 percent by weight including fragrance and about 76 percent by weight excluding fragrance.

Product Use and Marketing:

Personal Fragrance Products (products with 20 percent or less fragrance) are used by both men and women to impart a fragrance or scent. The concentration of fragrance oil found in different products can vary widely. Perfumes, toilet waters, colognes, and aftershaves make up the largest segment of the personal fragrance market. Perfumes, colognes, and toilet waters are generally more concentrated in fragrance, than body sprays or aftershaves, and are used in smaller quantities. In general, perfumes are the most expensive and concentrated, followed by toilet waters (or eau de toilettes), and colognes (or eau de colognes) (ARB, 1991a). Perfumes are typically used in small quantities and are intended for “spot” or “pulse point” application. Colognes and toilet waters are the most common fragrance form and are intended for “everyday” use (ARB, 1991a). These products are typically less concentrated and are used more liberally.

Personal Fragrance Products are typically sold in retail stores, department stores, and diversified drug stores, but are also available to consumers for purchase from discount warehouses, Internet companies, home sales, and catalog sales. It is estimated that sales of women’s fragrances are approximately twice as much as sales of men’s fragrance products (PCPC, 2006).

Product Formulation:

The main ingredients found in Personal Fragrance Products (products with 20 percent or less fragrance) are denatured alcohol (ethanol), fragrances, and water. Aerosol products also contain VOC propellants such as n-Butane, propane, isobutane, and/or the non-VOC propellant, HFC-152a. It should be noted that denatured alcohol often contains 5 to 7 percent water and that any VOC which is a fragrance in a Personal Fragrance Product is exempt from the VOC limits. Ethanol is the primary VOC ingredient in this category and is most likely to be the VOC ingredient that is reduced in the reformulation of a product.

The majority of Personal Fragrance Products (products with 20 percent or less fragrance) contain fragrance oil dissolved in ethanol and, to a lesser degree, water. Small amounts of other ingredients may also be included, such as preservatives, colorants, and agents used to prevent photodegradation or oxidation of fragrance ingredients (ARB, 1991a).

Proposed VOC Limit and Compliance:

Staff is not proposing to lower existing VOC limits for Personal Fragrance Product (products with 20 percent or less fragrance), but instead is proposing to eliminate the "Grandfather" clauses for this category. This would require that all products, new and existing, be subject to the same VOC standard, namely 75 percent by weight.

Based on the 2003 Survey, products within a signature line contain varying amounts of ethanol and fragrance, but continue to be labeled and sold under the same signature line as the same scent (ARB, 2004a). This is an indication that reformulation is possible, while preserving a signature scent. Companies with products covered under the "Grandfather" clauses may have been operating with a competitive advantage since 1995, having avoided the cost of reformulation, consumer testing, and marketing. This proposal will require companies to reformulate their products to meet the 75 percent by weight VOC limit, regardless of when they were first sold in California.

As shown in Table V-26 below, 679 products comply with the 75 percent by weight VOC standard; indicating that products can be reformulated to comply with the standard. The complying products account for about 37 percent of the market.

Removing the "Grandfather" clauses will result in an estimated emission reduction of 824 pounds per day, or 0.41 tons per day, using emissions adjusted to 2014. If adopted, the removal of the "Grandfather" clauses would become effective December 31, 2014. We are proposing to extend the effective date until December 31, 2014 because of the large number of products that would need to be reformulated.

Table VI-26
Personal Fragrance Product (products with 20 percent or less fragrance)
Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2014 Emission Reductions (lbs/day)+
All Forms	75 (Remove "Grandfather" clauses)	679	37	765	824

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2014 (see Chapter IV, Emissions).

Compliance with the Standard:

Removing the exemption for existing products will subject both new and existing Personal Fragrance Products (products with 20 percent or less fragrance) to a 75 percent by weight VOC standard. Reformulation options could include reducing ethanol content, adding water, making adjustments to fragrance components that can tolerate higher levels of water, and, if applicable, replacing VOC propellants with non-VOC propellants.

The most straightforward method of reformulating Personal Fragrance Products (products with 20 percent or less fragrance) is to replace some of the alcohol with water or some other non-VOC ingredients. Simple replacement, as industry has pointed out, may lead to an altered fragrance due to some of the fragrance oil ingredients "coming out of solution." However, emulsion technology or fragrance modification may be utilized to minimize fragrance alteration (ARB, 1991a).

Reformulation options also include adjustments to the fragrance oil components to allow for higher water content. For example, fractional distillation of the polar compounds, in some essential oils, would yield water-soluble extracts retaining the same fragrance as their essential oil even though they may differ greatly in chemical nature. Examples would include the distilled aromatic waters from rose, witch hazel, yarrow, orange flowers, chamomile, balm mint and linden (ARB, 1991a). One study reported that by lowering the quantities of crystalline materials such as vanillin, coumarin, and heliotropin and using resins such as oak moss and Mousse de Chene sparingly, fragrance solubility in aerosol products can be increased (ARB, 1991a).

Another reformulation option for aerosol products could include adjusting propellant. For example, the amount of VOC propellant could be adjusted or VOC propellant could be blended with non-VOC propellant, such as HFC-152a. However, we do not expect such propellant blending to occur as the limit is feasible without the use of HFC-152a, a more expensive propellant. Although hydrocarbon propellants function

also as solvents in aerosol formulations, they are poor solvents for some fragrance constituents. According to an article in "Cosmetics and Toiletries," hydrocarbon propellants are poor solvents for many of the polar constituents of perfume oils (ARB, 1991a). We conclude, for the reasons given, above, that it is unlikely propellant adjustments will result in fragrance alterations.

Issues:

- a. **Issue:** Reducing the alcohol content of personal fragrance products will result in some fragrance components precipitating out of solution, resulting in an altered fragrance.

Response: While simple replacement of alcohol with water may result in some fragrance components precipitating out, emulsifying agents may be used to prevent this. In addition, certain fragrance oil components are more compatible with water. By properly selecting the components from these fragrance oils, a formulator can create a scent that can tolerate high levels of water. According to the 1991 and 2003 ARB Consumer Products Surveys, many aftershave products with water content ranging from 10 to 90 percent have been identified. Colognes with 1 to 90 percent water content and perfumes with zero to 10 percent water content have also been identified.

- b. **Issue:** The proposed VOC restrictions will hinder the creative process of developing a fragrance by limiting the choice of fragrance oils.

Response: According to the 2003 Survey, there are over 670 products that comply with the existing 75 percent by weight VOC limit. ARB staff has identified complying colognes and perfumes from a number of the fragrance families, including, but not limited to the following: musk, floral, chypre, aldehydic, tobacco and leather, spicy, and oriental. This indicates that manufacturers will not be limited to a narrow range of scent types. In addition, the staff has identified a number of technologies that can be used to comply with the VOC standards in the regulation without necessarily limiting manufacturers to fewer fragrance oils. We are confident the creative abilities of perfumers and manufacturers will allow development of products that meet consumers' needs and reduce VOC emissions.

- c. **Issue:** The Personal Care Products Council has provided ARB staff with a two-tiered proposal for consideration. Products between 75 to 80 percent by weight VOC would be subject to a VOC limit of 75 percent by weight. Products above 80 percent by weight VOC would be reformulated to a VOC limit of 80 percent by weight. In addition, industry requests a lengthier compliance period of 5 years.

Response: Companies with products covered under the "Grandfather" clauses may have been operating with a competitive advantage since 1995, when the first-tier VOC limit of 80 percent by weight became effective. In order to level the

playing field for all stakeholders, staff is proposing a single VOC standard. However, staff is proposing an extended future effective date of December 31, 2014, to provide sufficient time for companies to reformulate and conduct consumer testing of the hundreds of currently “grandfathered” products.

REFERENCES

1. Air Resources Board. The California Consumer Products Regulations. December, 2007. (ARB, 2007a)
2. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2004a)
3. Air Resources Board. Final Statement of Reasons for Rulemaking, Public Hearing to Consider the Adoption of Amendments to the Regulation for Reducing Volatile Organic Compound Emissions from Consumer Products - Phase II. January 9, 1992. (ARB, 1992)
4. Air Resources Board. Proposed Amendments to the Statewide Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products - Phase II – Technical Support Document. October, 1991. (ARB, 1991a)
5. Personal Care Products Council (formerly known as Cosmetic, Toiletry and Fragrance Association). Presentation to ARB staff. July 26, 2006. (PCPC, 2006)

14. Sealant or Caulking Compound

Product Category Description:

Sealant or Caulking Compound is any product with adhesive properties that is designed to fill, seal, waterproof, or weatherproof gaps or joints between two surfaces, including threaded pipe sealants and gasket makers. Sealant or Caulking Compound does not include roof cements and roof sealants; insulating foams; removable caulking compounds; clear/paintable/water resistant caulking compounds; floor seam sealers; products designed exclusively for automotive uses; or sealers that are applied as continuous coatings. Sealant or Caulking Compound also does not include units of product, less packaging, which weigh more than one pound and consist of more than 16 fluid ounces.

“Removable caulking compounds” means a compound which temporarily seals windows or doors for three to six month time intervals. “Clear/paintable/water resistant compounds” means a compound which contains no appreciable level of opaque fillers or pigments; transmits most or all visible light through the caulk when cured; is paintable; and is immediately resistant to precipitation upon application.

Sealant and caulking products, packaged in aerosol and non-aerosol forms, were first regulated statewide under the “Midterm Measures II” of the Consumer Products Regulation, adopted in October of 1999, and a description of these products is also included in the staff report for that rulemaking (ARB, 1999). At that time, the Board adopted a single VOC limit of 4 percent by weight for all forms of these products, which became effective on December 31, 2002. We believe technology now exists to further reduce the VOC content limit for non-aerosol Sealant or Caulking Compound products. For this current rulemaking, staff is proposing to change the category name from Sealant and Caulking Compound to Sealant or Caulking Compound. In addition, staff has proposed to subcategorize the category into Non-Chemically Curing Sealant or Caulking Compound and Chemically Curing Sealant or Caulking Compound with different proposed VOC limits for non-aerosol products in these two subcategories. Other minor clarifications in the definition are also proposed, such as clarifying that the Sealant or Caulking Compound definition includes threaded pipe sealants and gasket makers.

We are proposing to divide the non-aerosol products into two subcategories based on the formulation technologies used. A Chemically Curing Sealant or Caulking Compound is defined as any Sealant or Caulking Compound which achieves its final composition and physical form through a catalyst-driven chemical reaction. The reaction causes a change in chemical structure, and leads to the release of chemical by-products. Chemically Curing Sealant or Caulking Compound includes, but is not limited to products that utilize silicone, polyurethane, silyl-terminated polyether or silyl-terminated polyurethane reactive chemistries. Chemically Curing Sealant or Caulking Compound does not include products, which are not solely dependent on a chemically curing process to achieve the cured state. Non-Chemically Curing Sealant or Caulking Compound means any Sealant or Caulking Compound which is not a Chemically Curing Sealant or Caulking Compound.

Staff is proposing to add clarifying language that the Sealant or Caulking Compound definition includes pipe thread sealants and gasket makers as these products are designed to fill, seal, waterproof or weatherproof gaps or joints between two surfaces. Staff has made a number of product reviews, at the request of manufacturers, and determined that such products are subject to the Consumer Products Regulation requirements for Sealant or Caulking Compounds.

While Sealant or Caulking Compound products come in several forms, ten to eleven fluid ounce disposable cartridges that fit in half-barrel caulking guns are the most common. Smaller squeeze tubes are also available. Sealant or Caulking Compound products vary in their ability to adhere to different materials and in their resilience, durability, cost, and ease of clean-up. Some products have special properties, such as mildew resistance, high flexibility, temperature resistance, abrasion resistance, paintability, and the ability to self-level.

By definition, the proposal affects products that consist of 16 fluid ounces or less and weigh one pound or less. The local air districts in California regulate the use of large size (greater than 16 fluid ounces or one pound) and industrial-use sealants and caulks. Following is a list of local air districts and their corresponding currently applicable Sealant or Caulking Compound regulations:

- Bay Area AQMD, Rule 8-51, Adhesives and Sealant Products;
- Sacramento Metropolitan AQMD, Rule 460, Adhesives and Sealants;
- Santa Barbara County APCD, Rule 353, Adhesives and Sealants;
- Shasta County APCD, Rule 3-32, Adhesives and Sealants;
- South Coast AQMD, Rule 1168, Adhesive and Sealant Applications;
- Tehama County APCD, Rule 4-40, Adhesives and Sealants; and
- Ventura County APCD, Rule 74.20, Adhesives and Sealants.

Table VI-27 summarizes the sales and emissions from Sealant or Caulking Compound products based on the results of ARB's 2003 Survey (ARB, 2004a). The data have been grown to the 2008 calendar year. Total category sales are about 141,927 pounds per day.

Estimated combined VOC emissions from the non-aerosol Sealant or Caulking Compound category are 5,168 pounds per day, or about 2.6 tons per day, in California. Although not shown in Table VI-27, the sales-weighted average VOC content was about 2 percent by weight for the non-aerosol products in the Non-Chemically Curing Sealant or Caulking Compound subcategory, and about 7 percent by weight for the non-aerosol products in the Chemically Curing Sealant or Caulking Compound subcategory, according to the 2003 Survey. The sales-weighted average VOC content values for the two subcategories were based on the group of products that also included sell-through products with VOC content above the current VOC limit of 4 percent for the category. Due to the impact of sell-through products with higher VOC content, the calculated values for the sales-weighted average are greater than what they would be with all products reformulated to meet the current VOC limit.

Product Use and Marketing:

Non-aerosol Sealant or Caulking Compound products are used to prevent air infiltration, heat loss, water penetration, insect entry, or to improve appearance while being flexible and resistant to substrate movement. These products are also used to prevent the passage of a liquid or gas between two surfaces, while being flexible and resistant to substrate movement.

Non-aerosol Sealant or Caulking Compound products are used extensively in the construction, remodeling, and maintenance of houses and other structures in order to further weatherize and protect the structure. There are many different types and uses for sealants and caulks, including: exterior sealants and caulks; all-purpose indoor/outdoor sealant and caulks; removable sealant and caulks; roof repair sealants

Table VI-27
Sealant or Caulking Compound (non-aerosol)*

Product Subcategory	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
Non-Chemically Curing Sealant or Caulking Compound (non-aerosol)	344	83,915	1,354
Chemically Curing Sealant or Caulking Compound (non-aerosol)	196	58,012	3,814
Total	540	141,927	5,168

* Based on 2003 Consumer and Commercial Products Survey. (ARB, 2004a)

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

and caulks; elastomeric sealant and caulks; high temperature sealants and caulks; waterproof (submerged) sealant and caulks; gasket makers; and pipe thread sealants. These products are used for filling gaps and cracks in a foundation; around windows and doors; vents; faucets; pipes; wiring; electrical and utility boxes; outlets; ceiling fixtures; drains; bathtubs; tiles; air conditioners; ceiling and wall joints; chimneys; and other uses.

The market offers Chemically Curing Sealant or Caulking Compound products and Non-Chemically Curing Sealant or Caulking Compound products. Chemically curing products undergo a chemical reaction in the presence of a catalyst leading to a change in chemical structure, such as cross-linking of a polymer, as part of the curing process. Non-chemically curing products do not participate in such chemical reactions. The curing actually occurs through a physical change by water or solvent evaporation.

Non-Chemically Curing Sealant or Caulking Compound (non-aerosol):

Non-Chemically Curing Sealant or Caulking Compound non-aerosol products do not cure through a chemical reaction. The curing results from solvent evaporation. Some of the basic types of sealants and caulks on the market today include acrylic latex caulks, solvent-based synthetic rubber products, butyl caulks, and oil-based sealants and caulks. Some non-chemically curing sealants and caulks use the terms “siliconized” or “polyurethane acrylic product” but they do not chemically cure.

Acrylic latex caulks are often chosen for general use because of their low price, durability, convenience, low odor, low toxicity, and effectiveness on both inside and outside surfaces. These compounds remain durable and flexible after they have been applied, and are not affected by the sun’s ultraviolet (UV) rays, alkali surfaces, or water. According to product labels, acrylic latex sealants will also adhere well to concrete, ceramic tile, paint, wood, sheet rock, plaster, bricks, plastic, and glass. However, they

are not recommended for use in extreme temperatures, continuously damp areas, or for high-movement areas (ARB, 1999).

Siliconized latex caulks have some of the performance characteristics of silicone-based chemically curing caulks. Silicone is added to latex for increased durability, better adhesion, and increased flexibility. Application is easy, clean-up is with water, and the cost is lower than pure silicone caulks. This caulk is paintable and comes in a variety of colors. Cure time is between 12-24 hours and the caulk should not be exposed to water in this period of time (ARB, 1999).

Solvent-based synthetic rubber sealants and caulks also claim to adhere well to most surfaces and can be applied under harsh weather conditions. They have an ability to recover, stretch and are paintable with water-based paints. These products are more prone to shrinkage and are flammable until they cure. They are also higher in VOC content (Pontolilo, 2004).

Butyl caulks are used to seal exterior metal and masonry surfaces. They are solvent-based with a life expectancy of 2 to 5 years. Although butyl caulks can be painted, they usually take 3 to 7 days to dry. Purported advantages of butyl caulks include their relatively low cost, good water resistance, and good adhesion without primers. Disadvantages may include limited joint movement tolerance, a tendency for shrinkage, and difficulty in forming a neat bead. However, butyl caulks will not become brittle and have good resiliency. Clean up can be difficult because they require special chemical solutions (ARB, 1999).

Oil-based sealants and caulks are usually inexpensive, low durability caulks composed of drying oils, such as linseed oil, and fillers. The oils slowly dry out and the caulk could show significant hardening and cracking within a year. They also can discolor and stain the surface to which they are applied when the surface is not primed (ARB, 1999).

Chemically Curing Sealant or Caulking Compound (non-aerosol):

Chemically Curing Sealant or Caulking Compound non-aerosol products include, but are not limited to, products that utilize silicone, polyurethane, silyl-terminated polyether and silyl-terminated polyurethane reactive chemistries. Products based on these reactive chemistries cure by absorbing atmospheric moisture.

Products with silicone chemical cure have a wide variety of performance characteristics. Silicone sealants and caulks have very little shrinkage, high flexibility, and are available both in clear and pigmented formula. According to manufacturers, these products are chosen by many consumers for their long term durability and UV resistance. As stated on product labels, silicone sealants and caulks are good for joints that move extensively, will perform at very low and high temperatures, and have a fast cure rate. These products are formulated for most substrates and are claimed to be good for adhesion to nonporous surfaces, such as glass, metal, ceramic tile and

porcelain. However, most silicone-based compounds cannot be painted and tear easily (Pontolilo, 2004).

Products utilizing polyurethane chemical cure claim to have versatile properties and are used in a wide range of commercial applications. Product labels indicate that they are flexible, can be painted and can adhere to most surfaces. In addition, these products have good chemical resistance. Consumers have a choice of non-sagging or self-leveling formulas (HPI, 2008). Polyurethanes are able to fill larger cracks because they expand when curing and can act as both an insulation and air barrier. However, polyurethanes must be protected from UV radiation (ARB, 1999).

Modified silicone polymer sealants are relatively new products that offer the benefits of water-based, silicone and polyurethane sealants. These products are also more expensive. According to product labels, modified silicone polymer sealants and caulks can be applied in extreme temperatures, are watertight almost immediately, are very durable and adhere well to most substrate materials. Modified silicone polymers include silyl-terminated polyether products. These products claim to be flexible, paintable, quick curing and do not shrink. They are also low in VOC content (Pontolilo, 2004). Silyl-terminated polyurethane products are purported to have several distinct advantages over conventional polyurethanes. These products show improved adhesion to glass, UV stability and weatherability (O'Connor, 2004).

Sealants and caulks are sold in hardware stores, home supply stores, paint stores, hobby and craft stores, and by mass merchandisers. Sealants are also sold to industrial or institutional users through distributors or through direct sales by the manufacturer.

Product Formulation:

Sealant or Caulking Compound products generally have low solvent levels, high concentrations of fillers, and are thick and nonpourable.

Non-Chemically Curing Sealant or Caulking Compound (non-aerosol):

Non-Chemically Curing Sealant or Caulking Compound non-aerosol products are either water-based or solvent-based. One of the advantages of water-based caulking compounds is that they can be cleaned up with water prior to curing. Solvent-based compounds must be cleaned up with solvents. Each type of sealant or caulking compound formulation offers its own particular strength and weakness depending on how it is used. Many products are formulated to meet the performance requirements described in American Society for Testing and Materials (ASTM) C-920, the "Standard Specification for Elastomeric Joint Sealants."

A typical formulation might consist of the following:

1. **Polymer** – Polymer is the most important contributing factor to sealant or caulk performance. It provides elastomeric and adhesive properties. Different types of resins

include oil-based, butyl, solvent-based acrylic, block copolymer, polyvinyl acetate and water-based acrylic polymers (ARB, 1999).

2. **Plasticizer** – Plasticizers improve sealant flexibility, extrudability of uncured product, and can reduce cost. The plasticizer must be compatible with the polymer system being used. As the plasticizer content increases, adhesion decreases. Types of plasticizers include phthalates, benzoate, and epoxidized oils (ARB, 1999).

3. **Filler** – Fillers provide reinforcement to the product, can reduce product raw material cost, add desired color to the product, and can impart sag or slump resistance. Types of fillers include calcium carbonate (chalk), aluminum silicate (clay), magnesium silicate (talc), fumed silica, cellulosic fiber, organic clays, titanium dioxide, carbon blacks, and metal oxides (ARB, 1999).

4. **Specialty Additives** – Additives are used to improve and enhance specific aspects of the sealant or caulk such as weatherability, adhesion, package stability, and cure rate. Examples of specialty additives are adhesion promoters, UV absorbers, biocides, pigments, and waterborne additives. Adhesion promoters, such as organotitanates and silane coupling agents, provide adhesion to specific substrates. UV absorbers, which include hindered amines and benzotriazoles, provide long term stability of the cured product and eliminate surface cracking, chalking, or discoloration. Finally, waterborne additives, such as freeze thaw stabilizers, are used to preserve the integrity of latex particles. Examples of common waterborne additives are: ethylene glycol, propylene glycol, urea, and isopropanol (ARB, 1999). Biocides are added to provide antimicrobial protection, which is especially important in sealants or caulks used in the kitchen and bathroom, where water and mildew are common (Pontolilo, 2004).

5. **Diluents** – Diluents reduce the viscosity and aid in the application of the sealant or caulk. For water-based formulations, water is the primary diluent, however, some VOC co-solvents are used including: acetates (acetic acid, butyl acetate, vinyl acetate, etc.), alcohols (ethanol, methanol, isopropanol, etc.), and glycols (ethylene glycol, propylene glycol, diethylene glycol methyl ether, etc.). Diluents used in solvent-based formulations include: mineral spirits, hexane, stoddard solvent, toluene, and xylene. Manufacturers limit the amount of diluents to control shrinkage resulting from the evaporation of the diluent during curing (ARB, 1999). A few products reported in the 2003 Survey contain perchloroethylene, an exempt VOC solvent.

Chemically Curing Sealant or Caulking Compound (non-aerosol):

Chemically Curing Sealant or Caulking Compound non-aerosol products participate in a chemical reaction. The reaction usually involves the formation of new internal bonds and results in a change in the chemical structure of the product, such as cross-linking of a polymer. As compounds undergo cross-linking reactions as part of the curing process, products become more stable and chemical by-products are released.

Chemically curing products that utilize silicone, polyurethane, or modified silicone polyether reactive chemistries react in the presence of moisture. Similar to non-chemically curing products, chemically curing products also contain fillers, polymers, plasticizers and specialty additives. These products also contain catalysts and cross-linkers. Catalysts are used to initiate the reaction, and examples include peroxides, tertiary amines, and compounds based on nickel, tin, or platinum (ARB, 1999). Cross-linkers are involved in the actual cross-linking once the cure reaction is initiated.

Silicone sealants contain siloxane polymers and plasticizers. Most of these are based on polydimethylsiloxane. Depending on whether the formula is based on an acetoxymethyl, neutral or basic cure type, cross-linkers involved can be acetoxymethyl, oxime or alcohol. Consequently, groups released during the reaction would include an acetic acid, an oxime, such as 2-oximobutane, or amine, such as cyclohexylamine, depending on the cure type (Macco, 2006).

Polyurethane cure reaction is based on the cross-linking of isocyanates and an alcohol (polyol) during cure. Some common isocyanates used in a formula include toluene diisocyanate, isophorone diisocyanate and hexamethylene diisocyanate (Macco, 2006).

Products that are based on silyl-terminated polyethers are very similar to silicone sealants and caulks with acidic cure. They differ in the types of cross-linker functional groups, leading to the release of an alcohol during the reaction, such as methanol, ethanol or propanol, instead of an acid (Macco, 2006). Silyl-terminated polyurethanes contain urethane prepolymers, prepared from the reaction of a diisocyanate and a conventional polyol, that are end-capped with an organo-functional silane. Silyl-terminated polyurethane sealants have been prepared with varying isocyanates, polyol, and silanes (O'Connor, 2004).

Proposed VOC Limit and Compliance:

The proposed VOC limit for the Non-Chemically Curing Sealant or Caulking Compound non-aerosol subcategory is 1.5 percent by weight, effective December 31, 2010. The proposed VOC limit for the Chemically Curing Sealant or Caulking Compound non-aerosol subcategory is 3 percent by weight, effective December 31, 2012.

As shown in Table VI-28a, using emissions adjusted to 2010, the proposed limit will result in an estimated emission reduction of 246 pounds per day, or about 0.12 tons per day, for the Non-Chemically Curing Sealant or Caulking Compound non-aerosol subcategory.

Table VI-28a
Non-Chemically Curing Sealant or Caulking Compound (non-aerosol)
Subcategory Proposal)

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2010 Emission Reductions (lbs/day)+
Non-aerosol	1.5	201	76	240	246

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2010 (see Chapter IV, Emissions).

Complying products in the Non-Chemically Curing Sealant or Caulking Compound non-aerosol subcategory include water-based and solvent-based technologies. Only those products complying without the use of perchloroethylene are included in the complying market share data. Most of the complying products are water-based formulations. Reformulation options include switching from solvent-based formulations to water-based formulations, using alternative LVP-VOC solvents or a combination of VOC and LVP- VOC solvents. These alternative ingredients are already being used in many products.

As shown in Table VI-28b, using emissions adjusted to 2012, the proposed limit will result in an estimated emission reduction of 446 pounds per day, or about 0.22 tons per day, for the Chemically Curing Sealant or Caulking Compound non-aerosol subcategory.

Table VI-28b
Chemically Curing Sealant or Caulking Compound (non-aerosol) Subcategory
Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2012 Emission Reductions (lbs/day)+
Non-aerosol	3	95	23	420	446

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2012 (see Chapter IV, Emissions).

Non-complying products in the Chemically Curing Sealant or Caulking Compound non-aerosol subcategory may reformulate by lowering the amount of VOC solvents, using alternative LVP-VOC solvents or a combination of both. Where the essential formulation components involved in the chemical cure reaction contribute to

VOC content themselves or lead to the formation and release of VOC compounds as by-products of the cure, products may reformulate by slightly reducing the levels of VOC cross-linkers or other VOC ingredients and increasing the levels of non-VOC ingredients, such as fillers, non-VOC polymers and resins, and other additives.

In some cases, reformulation efforts will involve modification of the existing resins/polymers or development of new resins for some of the reactive chemistries. Currently, the market resin supply is somewhat uncertain. Resins are not developed specifically for sealants and caulks because it is a small market. Hence, manufacturers have to select from those available and test different resins and combinations. Because of this, staff believes an extended effective date is warranted. The Chemically Curing Sealant or Caulking Compound non-aerosol subcategory would be given until December 31, 2012, to comply with the proposed VOC limit. This extra time should give manufacturers the time required for research and development efforts to work with resin and polymer reactive chemistry systems to develop a complying formula.

Staff is also proposing in section 92412(d) additional labeling requirements for non-aerosol Sealant or Caulking Compound. The product category as specified in section 94509(a), or an abbreviation of the category, and the applicable VOC standard shall be displayed. This requirement is to facilitate enforcement of the applicable standards for Chemically Curing and Non-Chemically Curing products.

Aerosol Sealant or Caulking Compound products continue to be subject to the 4 percent VOC by weight limit, effective December 31, 2002. Our data show that there are existing compliant Chemically Curing and Non-Chemically Curing aerosol products.

Because our data for both aerosol and non-aerosol products show compliance can be achieved without the use of methylene chloride, perchloroethylene, and trichloroethylene, we are proposing to prohibit the use of these TACs from the Sealant or Caulking Compound category, effective December 31, 2010. Methylene chloride and perchloroethylene are exempt VOC solvents. Therefore, without the prohibition, their use could increase as products reformulate to comply. Trichloroethylene is a VOC, and its use would likely decrease to meet the proposed limit. However, other solvents are available that make its use unnecessary. Prohibiting these three TACs will lead to approximately 0.12 tons per day of toxic compound emission reductions from this category. The health effects associated with exposure to perchloroethylene, methylene chloride and trichloroethylene, are summarized in Chapter VIII, Environmental Impacts.

Issues:

- a. **Issue:** Non-Chemically Curing Sealants or Caulks serve a wide range of applications, including many specialty uses and substrates. The VOC standard should allow for the whole range of general use and specialty applications.

Response: Analysis of 2003 Survey data indicates that 76 percent of the market complies with the proposal for the Non-Chemically Curing Sealant or Caulking

Compound non-aerosol subcategory. Many of these products can be applied to a varied range of substrates, including many specialty use applications. Staff believes, and some industry stakeholders have agreed, that the proposed VOC standard allows for a wide range of general and specialty use product applications.

- b. **Issue:** The lower VOC limit proposed for Non-Chemically Curing Sealant or Caulking Compound products will have a negative effect on product performance, causing the market to shift to the use of Chemically Curing Sealant or Caulking Compound products, which have a higher VOC standard.

Response: As stated in response to the first issue, staff believes that the proposed VOC limit for Non-Chemically Curing Sealant or Caulking Compound non-aerosol products will accommodate a wide range of product applications. In addition, there are existing products that meet the definition of the Chemically Curing Sealant or Caulking Compound non-aerosol subcategory that are low in VOC content. These products claim to perform well under extreme weather conditions and can be used for many applications.

- c. **Issue:** Staff is adding pipe thread sealants and gasket makers to the definition of Sealant or Caulking Compound. Pipe thread sealants and gasket makers were not included in the original proposal to regulate Sealant or Caulking Compounds and should not be added to the definition.

Response: Staff is making a clarification that the Sealant or Caulking Compound category definition does include pipe thread sealants and gasket makers as these products are designed to fill, seal, waterproof or weatherproof gaps or joints between two surfaces. Staff has made a number of product reviews, at the request of manufacturers, and determined that such products are subject to the Consumer Products Regulation requirements for sealant or caulking compounds. A number of chemically curing and non-chemically curing pipe thread sealants and gasket makers were reported in the 2003 Survey, with complying products existing in both subcategories.

- d. **Issue:** The proposed lower VOC limits will eliminate the aerosol product form.

Response: Staff's proposal sets lower VOC limits for non-aerosol products only. The current VOC limit of 4 percent by weight for the Sealant or Caulking Compound category is applicable to all product forms and will continue to be applicable to aerosol forms. The 2003 Survey indicates that there are products utilizing aerosol technologies available on the market, in both the Chemically Curing and Non-Chemically Curing Sealant or Caulking Compound non-aerosol subcategories that comply with the existing 4 percent by weight VOC limit.

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15. Spot Removers

Product Category Description:

Spot Removers are used to remove localized spots or stains on articles such as carpets, rugs, upholstery, drapes, or clothing. Subsequent laundering is not required to achieve stain removal. Spots and stains include visible contamination from spills and other mishaps. The distinction between Spot Removers and related cleaning products, such as Carpet/Upholstery Cleaner, is that Spot Removers are “on-demand” products for local treatment/cleaning of areas with heavier dirt or stains, while the cleaning products are for general cleaning of the majority of, or an entire article, after routine accumulation of contaminants over time. Generally, Spot Removers use more powerful cleaning ingredients than Carpet/Upholstery Cleaners. Some products are intended for specific types of soils. Spot Removers do not include products that treat spots and stains on clothes or other fabrics that need subsequent laundering (machine or hand

wash) to remove the stain. Such products are included in the category of Laundry Prewash.

Spot Removers include products designed to remove tough, localized stains, such as grease, oil, oxidized oil (old, dried-out), tar, dry paint spots (latex, oil-based, enamels), blood, urine, vomit, feces, most foods, make-up, crayon, lipstick, nail polish, floor waxes, rust, or ink. A product may be intended for one type of stain, or for several. While the cause and contamination in some spots/stains may be known such that an appropriate type of Spot Remover is chosen, others may be of unknown origin. "Unknown" spots and stains may be treated by "universal" Spot Removers intended for several types of contamination, or by "trial-and-error" with a series of different Spot Removers, each for a different type of spot/stain. For treating localized odor contamination, Spot Removers may use biologically-derived odor destroying ingredients (e.g. enzymes or live bacterial culture).

Spot Removers were regulated under "Mid-term Measures 1" of the Consumer Products Regulation approved on July 24, 1997, and a description of these products is also included in the staff report for that rulemaking (ARB, 1997b). At that time, the Board adopted, as staff had recommended, a VOC limit of 25 percent by weight for aerosol products, and a VOC limit of 8 percent by weight for non-aerosol products. Both VOC limits became effective January 1, 2001.

The Spot Remover category does not include Dry Cleaning Fluid. Dry Cleaning Fluid includes non-aqueous liquid products used exclusively on fabrics labeled "for dry clean only" or on "S-coded" fabrics specified by the Joint Industry Fabric Standards Committee to be cleaned only with water-free spot cleaning products.

Also historically, the category excluded Multi-purpose Solvents, which are defined as organic liquid products with no VOC limit. However, the 2006 Consumer Products Regulation amendments (ARB, 2006a; ARB, 2007e) to section 94508(a) modified requirements. Multi-purpose Solvent products manufactured on or after January 1, 2008, with multiple-use claims, are subject to the Spot Remover VOC limit if the product label includes a claim for spot or stain removal from fabric surfaces. The product would also be subject to the "most-restrictive-limit" provisions of section 94512(a).

Table VI-29 below summarizes the sales and emissions from Spot Remover products based on the results of ARB's 2003 Survey (ARB, 2004a). The data have been grown to the 2008 calendar year. Total category sales are 42,308 pounds per day.

As shown in Table VI-29, Spot Remover products are sold in both the aerosol and non-aerosol forms, with estimated VOC emissions of 2,105 pounds per day, or about 1.05 tons per day, in California. Although not shown, the sales-weighted average VOC content of the aerosol and non-aerosol products are about 22 and 2 percent by weight, respectively.

**Table VI-29
Spot Remover***

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
Aerosol	70	6,910	1,520
Non-Aerosol	361	35,398	585
Total	431	42,308	2,105

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

Product Use and Marketing:

Spot Removers are used by household consumers for cleaning localized spots, stains, and soiled areas on fabric articles in homes and vehicles. Spot Removers are also used by commercial/institutional professionals such as janitors; carpet, furniture, drapery, and laundry workers; commercial detailers of automotive interiors; workers in health care facilities; and remediation specialists for fabric articles in buildings after fire/smoke damage.

Spot Removers are applied by aerosol spray, mechanical sprayer, bottle dispenser, or special applicator, to the affected area, and left to soak to release/treat the spot or stain in the fibers. The area is then blotted with a dry cloth or scrubbing cap to lift and remove the contaminants from the substrate. Sometimes repeat application is needed to adequately remove the spot or stain. The area may be dampened with water from a clean cloth, and blotted with a dry cloth to dilute and remove residual cleaner. The area is then allowed to dry (ARB, 1997b).

Both Spot Removers and Laundry Pre-wash products claim to treat or remove localized spots. However, the products differ in that Laundry Pre-wash products contain instructions for treating stains on articles prior to laundering, while Spot Removers do not.

The Spot Remover category is currently regulated as “aerosol” and “non-aerosol” products with different VOC limits. Spot Removers are sold in general merchandise, hardware, drug stores, supermarkets, automotive parts stores, janitorial and maintenance supply warehouses, and over the Internet. Some products are packaged as kits containing products formulated for different types of spots or stains (ARB, 1997b).

Product Formulation:

Spot Removers are generally water-based products containing ingredients such as glycol ethers, isopropyl alcohol, surfactants, enzymes, and various inorganic cleaning compounds. Ingredients vary depending on the types of spots and stains,

although many products are formulated for general use to address several types of stains. A common ingredient is 2-butoxyethanol (also called ethylene glycol monobutyl ether) which is used to treat many solvent-based and water-based stains. Other glycol ethers are also used, some of which are VOCs, but others are LVP-VOCs and are thus, slower drying.

Typically, products complying with the current 25 percent VOC limit for aerosols, may contain zero to 20 percent VOC cleaners such as VOC glycol ethers, alcohol, or other organic compounds such as surfactants, and 5 to 10 percent hydrocarbon propellant. Surfactants or enzymes, typically classified as LVP-VOCs, may be part of the formulation to clean soils, including oily spots and stains. Enzymes and other biologically-derived ingredients, such as non-pathogenic bacterial cultures may be used to address odor, grease, and other organic contamination. Some products use oxygen compounds (e.g. bleach) to clean stains. With non-VOC propellants such as HFC-152a, products may contain up to 25 percent VOC cleaning ingredients under the current VOC limit. Some products rely on surfactants, containing minimal or no VOCs, for removal of various contaminants including oil and grease. Inorganic ingredients may be used as cleaners, or to enhance the cleaning effectiveness of surfactants.

The non-aerosol products are generally liquids applied by trigger sprayer, hand-pump-pressurized tank sprayer, or bottle dispenser. Low-VOC products are typically water-based and may include LVP-VOC cleaners, such as surfactants and LVP-VOC glycol ethers, and inorganic ingredients. Some products for commercial/institutional use are sold in dilutable (i.e. concentrated) liquid form.

Specialized products also exist in this category. For example, products containing mainly acid or bleach (inorganic and thus zero-VOC) are used to remove rust and certain water-based stains.

Proposed VOC Limit and Compliance:

The proposed VOC limit for Spot Remover is 15 percent by weight for aerosols and 3 percent by weight for non-aerosols, effective December 31, 2010. As shown in Table VI-30, using emissions adjusted to 2010, the proposed limits for the category will result in an estimated emission reduction of 573 pounds per day, or about 0.29 tons per day statewide.

Table VI-30 also shows that about 4 percent of the aerosol market currently complies with the proposed 15 percent VOC limit, and 94 percent of the non-aerosol market complies with the 3 percent VOC limit.

**Table VI-30
Spot Remover Proposal ***

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2010 Emission Reductions (lbs/day)+
Aerosol	15	18	4	468	479
Non-Aerosol	3	231	94	91	94
Total	-----	249	-----	559	573

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2010 (see Chapter IV, Emissions).

The proposed 15 percent VOC limit for aerosol products is intended to allow both sufficient VOC solvent for removing grease or oil-type spots and stains, and sufficient hydrocarbon propellant for adequate spray performance. Products may be formulated to contain LVP-VOCs and non-VOC ingredients such as surfactants, enzymes, live bacterial cultures, inorganic compounds, or exempt compounds.

Alternative formulations with non-VOC propellant would enable up to 15 percent VOC solvent ingredients, with the addition of non-VOC ingredients as discussed above. Non-VOC propellants available include compressed carbon dioxide.

A reformulation option is limited use of acetone (a VOC exempt compound). Because it is an aggressive solvent that may damage common materials, acetone may have limited applications for certain fabrics with nearby surfaces vulnerable to over-spray. Acetone is not suitable for use on acetate, triacetate, and modacrylic fabrics, and must be used away from plastic or wood finishes. Acetone, as well as certain other organic and hydrocarbon solvents, may have limited use with carpets and rugs with vulnerable backing material. Because of its fast drying characteristics, acetone in a formulation may be used to supplement and partially offset the slower drying characteristics of LVP-VOC ingredients.

Regarding non-aerosol products, the VOC proposal would allow up to 3 percent VOC cleaning solvent. The balance would be primarily water with small amounts of LVP-VOC solvents, acetone, surfactants, enzymes, live bacterial cultures, inorganic compounds, or other exempt compounds.

The few products with perchloroethylene (an exempt chlorinated compound and thus non-VOC) are aerosols and generally low-VOC. However, the combined sales of these products were minimal and are not portrayed in the complying market share. The 15 percent VOC proposal is minimally affected by the presence or absence of the perchloroethylene products in the data. The 2003 Survey data show very limited use of

perchloroethylene and trichloroethylene (a VOC chlorinated compound) in this category. While ARB staff believes these toxic air contaminants are not likely to be used as cleaning solvents in the future reformulated products, ARB staff is proposing that perchloroethylene, trichloroethylene, and methylene chloride be prohibited in the Spot Remover category. This prohibition is proposed to ensure that manufacturers do not choose to reformulate with toxic chlorinated solvents in response to the lower VOC limits. Staff has determined that currently available formulation technologies that do not contain perchloroethylene, trichloroethylene, or methylene chloride are readily available and thus they are not needed to comply with the proposed standard. See Chapter VIII for a discussion of the health effects of perchloroethylene, trichloroethylene, and methylene chloride.

To update and strengthen regulatory requirements, the Multi-purpose Solvent exclusion in the definition is proposed to be eliminated. This revision would make the requirements for Spot Remover consistent with the adopted 2006 update for Multi-purpose Solvent. Also, when a product is subject to more than one VOC limit, the most restrictive limit would apply, in accordance with section 94512(a).

A new exclusion for aerosol gum remover products is proposed for the category definition. A literal interpretation of the current Spot Remover definition may include aerosol gum removers, since gum contamination on fabric may be considered "spots." Since the formulation and method of operation of aerosol gum removers are very different from typical Spot Removers, staff believes it is not appropriate to include aerosol gum removers in this category. Aerosol gum remover products, will be evaluated for regulation in the future.

Issues:

- a. **Issue:** VOC solvents are needed to remove oil-based stains such as lipstick, nail polish, ink, tar, oxidized oils (old, dried-out), dry paint spots (latex, oil-based, enamels), floor waxes, and crayon. LVP-VOC solvents do not work well because they do not evaporate quickly and are very sticky. The resulting sticky residues attract more soil. The cleaning of fabrics is different than the cleaning of hard surfaces, which can be easily wiped off for faster drying.

Response: When LVP-VOC solvent cleaners are used, the extent of the slower drying time will depend on the amount used, how thoroughly residual cleaners are diluted and removed, and how crucial the longer drying time is. Products already exist with LVP-VOC solvent cleaners, as indicated by the 2003 Survey, that comply with the proposed VOC limits. For products that will need reformulation, greater use of a wet cloth for diluting residual cleaners, and more thorough blotting with dry absorbent cloth, may be appropriate. Increased caution and customer education by product marketers, to avoid product-over-use and encourage appropriate drying procedures and proper article return-to-service, should address the concerns with LVP-VOCs.

- b. **Issue:** This category includes a broad range of products for a variety of fabrics and soils. Reported products include many based on non-VOC ingredients, such as bleach, hydrogen peroxide, acid, or surfactant, which are appropriate for some types of soils. Hydrogen peroxide, hypochlorite, and certain enzymes can not be used on all types of fabrics due to possible damage to fabrics. There is a wide range of VOC levels, which reflect the variety of intended uses. In some cases, higher VOC levels are needed to remove difficult stains and soils.

Response: We have considered the functions of low-VOC products and inorganic ingredients for particular types of spots and stains, as well as the advantages and limitations. We are also aware that many complying products make universal spot removing claims, some not needing VOC solvents. High VOC products may create emissions without a cleaning benefit when treating spots and stains that do not need VOC solvents. Our proposal addresses both those products for specific spot removal, and products for general spot removal. Regarding damage to fabrics, the product marketer should determine the type of product for the type of spots and stains to be addressed for different fabrics and articles, and to provide appropriate label warnings. Label instructions now commonly suggest that the customer test the Spot Remover on an inconspicuous location on the fabric before fully using it.

- c. **Issue:** Products containing perchloroethylene (an exempt compound) in the 2003 Survey data provide a false impression of the extent of low-VOC products. These products should be removed from the data, since use of perchloroethylene, a toxic air contaminant, should not be considered a realistic reformulation option to lower VOC content in this category.

Response: We agree that perchloroethylene products should not be relied on as a basis to lower VOC limits. We also believe that these products should not be marketed in the future because of air toxics concerns. However, the amount of product sales in 2003 with this compound was low and minimally affected the complying market share or the basis of our proposal, as discussed above. We have also reviewed the survey data with and without the perchloroethylene-containing products, and have presented the 2003 Survey results with the products included since that was the historical reality at the time. We believe there is no misrepresentation of the survey results as shown.

- d. **Issue:** Products with label claims for general carpet cleaning, in addition to localized cleaning, should be move from the Spot Remover category to the Carpet/Upholstery Cleaner category.

Response: To a certain extent, we agree that products should be considered in one product category or another. If a product is labeled clearly as Carpet/Upholstery Cleaner with only incidental use as Spot Remover, we would agree. However, a product label may have several equally important recommend uses, and thus fall under more than one category. For regulatory development purposes, a product as labeled may be appropriately considered in more than

one categories for review, depending on the wording of the various category definitions and the product label, although the regulatory emission reduction should be counted for only one category. We also consider the category identified by the marketer, since the marketer is most familiar with the product and has the first opportunity to categorize the product when submitting the survey. Please note that data review is separate from any enforcement evaluation for individual products.

- e. **Issue:** ARB should regulate non-aerosol Spot Removers used by dry cleaning establishments. Water-based and soy-based alternative Spot Removers are available alternatives to the currently used and more toxic perchloroethylene and trichloroethylene-based Spot Removers. Alternative Spot Removers perform well and are less costly.

Response: While currently available data are encouraging for spot removal for water-tolerant or water-washable articles, data are currently lacking on suitable low-VOC, non-chlorinated, Spot Remover products for dry-clean-only fabrics. ARB staff intends to reevaluate the "dry-clean-only" exclusion in the Spot Remover definition, when more data become available regarding the suitability of low-VOC, non-chlorinated products for use on dry-clean-only fabrics. However, with products for other types of fabric (i.e. water-tolerant or water-washable), the exclusion does not apply, and hence the proposed VOC limits would apply to Spot Remover products labeled for general spot removal (i.e. suitable for water-tolerant or water-washable fabrics) that may be used in dry cleaning establishments.

REFERENCES

1. Air Resources Board. Final Statement of Reasons for Rulemaking, Including Summary of Comments and Agency Responses -- Public Hearing to Consider Adoption of Proposed Amendments to the California Consumer Products Regulation and the Aerosol Coatings Regulation - Scheduled for Consideration November 17, 2006 - Agenda Item No. 06-10-8. Submitted to Office of Administrative Law on September 26, 2007. (ARB, 2007e)
2. Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation and the Aerosol Coatings Regulation. September 29, 2006. (ARB, 2006a)
3. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2004a)
4. Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation: Midterm Measures I. June 6, 1997. (ARB, 1997b)

5. Institute for Research and Technical Assistance. Spotting Chemicals: Alternatives to Perchloroethylene and Trichloroethylene in the Textile Cleaning Industry. Prepared by Katy Wolf and Mike Morris for Cal/EPA's Department of Toxic Substances Control and U.S. Environmental Protection Agency Region IX. January 2007. (IRTA, 2007)
6. Institute for Research and Technical Assistance. Evaluation of New and Emerging Technologies for Textile Cleaning. Prepared by Michael Morris and Dr. Katy Wolf for Air Resources Board and Cal/EPA (Agreement Number 02-408), and U.S. Environmental Protection Agency. August, 2005. (IRTA, 2005)

16. Tire or Wheel Cleaner

Product Category Description:

Tire or Wheel Cleaner means a product designed or labeled exclusively to clean either tires, wheels, or both. Tire or Wheel Cleaner includes, but is not limited to, products for use in commercial, fleet, hand, and “drive-through” car washes, commercial truck or large vehicle washing stations, vehicle dealers and repair shops as well as products intended for household consumer use. Tire or Wheel Cleaners include aerosol products as well as non-aerosol products, which can be found in both dilutable and ready-to-use forms. Tire or Wheel Cleaners do not include products identified as Rubber/Vinyl Protectant and Motor Vehicle Wash.

Tire or Wheel Cleaner is a previously unregulated category. Table VI-31 below summarizes the sales and emissions from Tire or Wheel Cleaners based on the results of ARB’s 2003 Survey (ARB, 2004a). The data have been grown to the 2008 calendar year. Total category sales are about 9,829 pounds per day.

Table VI-31
Tire or Wheel Cleaner*

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
Aerosol	8	189	17
Non-aerosol	102	9,640	278
Total	110	9,829	295

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

Estimated VOC emissions are 295 pounds per day, or about 0.15 tons per day. As shown in Table VI-31, non-aerosol Tire or Wheel Cleaner products dominate the marketplace. Although not shown in the table, aerosol Tire or Wheel Cleaners have a

sales-weighted average of about 8 percent by weight VOC, while the non-aerosol products have a sales-weighted average of 2 percent by weight VOC.

Product Use and Marketing:

Tire or Wheel Cleaners are used by both commercial businesses and “do-it-yourself” consumers. For the “do-it-yourself” consumers, tire cleaners, wheel cleaners, and combination tire and wheel cleaners are available in, but not limited to, retail outlets such as supermarkets, diversified pharmacies, home improvement stores, auto supply stores, super stores, and specialty stores. Auto dealers, catalog sales, and the Internet are additional marketing locations. For commercial businesses, products are available from manufacturers and/or distributors, and warehouses as well as retail outlets.

Tire or Wheel Cleaners are normally designed to be sprayed onto the part and then washed or wiped off. The majority of the products in this category are non-aerosol products that are designed to be applied either by pump spray or diluted with water before use. Tire or Wheel Cleaner products claim to remove dirt, debris, and other soils from the surfaces of tires, wheels, or both. Most wheel cleaners claim to be available for use on all wheel surfaces, including chrome and aluminum. Tire cleaners claim to be usable on either regular tires or specifically on whitewall tires.

Product Formulation:

Tire or Wheel Cleaners are water-based products containing glycol ethers, alcohols, VOC and LVP-VOC hydrocarbon solvents, and inorganic compounds. The glycol ethers, VOC solvents, and alcohols make up the majority of the product’s VOC content and act as the active ingredients. The inorganics and LVP-VOC solvents are normally surfactants to aid in cleaning. The aerosol products normally use a small amount of hydrocarbon propellant.

Proposed VOC limit and Compliance:

The proposed VOC limits for aerosol and non-aerosol Tire or Wheel Cleaner are 8 and 2 percent VOC by weight, respectively, effective December 31, 2010. As shown in Table VI-32 using adjusted emissions, the proposed limits will result in an estimated reduction of 130 pounds per day, or about 0.06 tons per day.

Table VI-32 also shows that 69 percent of the non-aerosol market currently complies with the proposed VOC limit. The percent of the market that currently complies with the proposed aerosol limit of 8 percent VOC is small and therefore treated as confidential.

**Table VI-32
Tire or Wheel Cleaner Proposal***

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2010 Emission Reductions (lbs/day)+
Aerosol	8	***	***	2	2
Non-aerosol	2	63	69	126	128
Total	—	—	—	128	130

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2010 (see Chapter IV, Emissions).

Most of the non-complying products are already formulated close to the proposed limits, so the proposed effective date is feasible. The few manufacturers that would have to reformulate should be able to meet the proposed limits by increasing the product's water and/or LVP-VOC content.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2004a)

17. Windshield Water Repellent

Product Category Description:

Windshield Water Repellents are products designed or labeled exclusively to repel water from motor vehicle windshields and other exterior glass surfaces. These products claim to improve driving visibility during inclement weather by repelling rain, sleet and snow. Windshield Water Repellents do not include Automotive Windshield Washer Fluid. Automotive Windshield Washer Fluids are designed, or labeled, to clean glass surfaces, while Windshield Water Repellents are applied to surfaces that have already been cleaned.

Windshield Water Repellent is a previously unregulated category. Table VI-33 below summarizes the sales and emissions from Windshield Water Repellent based on the results of ARB's 2003 Survey (ARB, 2004a). The emissions have been grown to the 2008 calendar year. Total category sales are about 538 pounds per day.

**Table VI-33
Windshield Water Repellent***

Product Form	Number of Products	2008 Category Sales (lbs/day)**	2008 Adjusted VOC Emissions (lbs/day)**
All Forms	30	538	462

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Survey data adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

As shown in Table VI-33, Windshield Water Repellent products have estimated VOC emissions of 462 pounds per day, or about 0.23 tons per day, in California. Although not shown, Windshield Water Repellent has a sales-weighted average VOC content of about 86 percent.

Product Use and Marketing:

Windshield Water Repellents are used by both commercial businesses and “do-it-yourself” consumers. For the “do-it-yourself” consumers, Windshield Water Repellents are available in, but not limited to, retail outlets such as supermarkets, diversified pharmacies, home improvement stores, auto supply stores, super stores, and specialty stores. Auto dealers, catalog sales, and the Internet are additional marketing locations. Products for commercial businesses are available from manufacturers and/or distributors, and warehouses, as well as retail outlets. Windshield Water Repellents are sometimes applied to glass surfaces by the original equipment manufacturer.

Windshield Water Repellent products are sprayed, or rubbed, onto clean, exterior windshields and other glass surfaces to provide a water repellent coating. This coating repels rain by producing a high water contact angle such that bead droplets form and roll down the surface, instead of sticking to the glass, leaving the windshield clear (CSPA, 2006). This is especially useful during the more hazardous weather conditions that contribute to lowered visibility.

Product Formulation:

Windshield Water Repellents have essential performance needs. They must provide a static, high, contact angle. Water should bead and roll down the windshield, rather than leave a droplet trail, and it must function with the current windshield wiper. Use of the product must not result in abrasion, streaking, or haze on the glass, due to the product’s use, as these instances would reduce visibility, thereby becoming a potential consumer safety issue.

To provide this function, Windshield Water Repellents are typically formulated with alcohols and inorganics. The alcohols provide solvency for the inorganic coating, normally a surfactant, so that it can be readily applied onto the surface of the windshield

or other automotive glass surfaces. Alcohol-based products with a silicone catalyst dominate the market. Some products were also found to contain LVP-VOC compounds, as well as VOC propellants.

Available technologies include silicone with an acid catalyst, organo-silanes, silicone functionalized surfactants, carnauba wax, silicone emulsion, diamond-like carbon coatings, and hydrophobic treated nano-particulates (CSPA, 2006).

Proposed VOC Limit and Compliance:

The proposed VOC limit for Windshield Water Repellent is 75 percent, by weight, effective December 31, 2010. As shown in Table VI-34, using adjusted emissions, the proposed limit will result in an estimated emission reduction of 84 pounds per day, or about 0.04 tons per day.

Table VI-34 also shows that the percent of the market that currently complies with the proposed 75 percent VOC limit is small and therefore treated as confidential.

Table VI-34
Windshield Water Repellent Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2008 Emission Reductions (lbs/day)**	2010 Emission Reductions (lbs/day)+
All Forms	75	***	***	83	84

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2004a).

** Emission reductions adjusted for complete market coverage and grown, by population, to 2008 (see Chapter IV, Emissions).

+ Emission reductions adjusted for complete market coverage and grown, by population, to 2010 (see Chapter IV, Emissions).

Water-based technology, for Windshield Water Repellent, is being researched by manufacturers. However, at present time, further development is necessary. We believe that technology is advancing that would allow lower VOC products in the future. The proposed 75 percent VOC limit is set as low as current technology allows. Staff believes manufacturers will be able to use current LVP-VOC technology to formulate effective products while developing the technology to implement more LVP-VOC solvent use as well as water-based technology.

Issues:

- a. **Issue:** The effective date for the limit should be extended until 2012 to allow adequate time for reformulation.

Response: Staff believes that the current effective date of 2010 is sufficient time to allow for reformulation to meet the proposed 75 percent VOC limit and make

complying products available in the marketplace. We also note that in a 2006 presentation industry indicated that a 75 percent VOC limit was feasible.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2004a)
2. Consumer Specialty Products Association. CSPA Automotive and Solvent Products Technical Seminar for ARB Staff. July 13, 2006. (CSPA, 2006)

B. CATEGORIES FOR WHICH A GREENHOUSE GAS LIMIT IS PROPOSED

1. Pressurized Gas Duster

Product Category Description:

Pressurized Gas Duster is a product designed to remove foreign particles such as dust, dirt, lint, and other particles from sensitive equipment and materials, solely by the means of mass air or gas flow. Pressurized Gas Dusters are distinguished from Electronic Cleaners which remove foreign particles primarily by means of a solvent.

The Board first defined Pressurized Gas Duster in the 2004 rulemaking (ARB, 2004b). However, at that time, no VOC standard for Pressurized Gas Duster was established.

In this rulemaking, we are proposing to limit the global warming potential (GWP) of compounds used in Pressurized Gas Dusters. To implement this proposal, we are proposing to add definitions for “Global Warming Potential” and “Global Warming Potential Value.” These definitions are necessary to implement our proposal to reduce the potency of greenhouse gas emissions from Pressurized Gas Dusters. We are using the GWP definition of the Intergovernmental Panel on Climate Change (IPCC). GWP provides a measure of a compound’s impact on global warming compared to CO₂. The GWP value definition specifies that the 100-year GWP values in the Second Assessment Report (SAR) of IPCC would be used to determine compliance. To enforce our proposal to reduce greenhouse gas emissions from Pressurized Gas Duster, the definition further specifies that, if the SAR does not contain a GWP value for a specific chemical or compound, then the IPCC, Fourth Assessment Report (FAR) GWP value for that chemical or compound can be used. If there is no GWP value listed for a specific chemical or compound in the SAR or the FAR, then the GWP value is assumed to be equal to the GWP applicable standard.

As defined by the Intergovernmental Panel on Climate Change 1995: Second Assessment Report (IPCC, 1996), the GWP of a greenhouse gas (GHG) is defined as the radiative forcing impact of one mass-based unit of a given greenhouse gas relative

to an equivalent unit of carbon dioxide over a given period of time. The standard units of measurement used to express the emissions of a GHG are million metric tons of carbon dioxide equivalent (MMT CO₂e) per year.

The global warming potential (GWP) of products in this category is high due to the use of hydrofluorocarbon-134a (HFC-134a) and hydrofluorocarbon-152a (HFC-152a). HFC-152a has a GWP of 140, which is one hundred and forty times greater than the GWP of carbon dioxide (CO₂). HFC-134a has a GWP of 1300, which is approximately ten times greater than the GWP of HFC-152a and 1300 times greater than CO₂ (IPCC, 1996; IPCC, 2007).

We are also proposing to modify the definition for Pressurized Gas Duster to exclude electronic cleaners, electrical cleaners, or energized electrical cleaners. However, we are proposing to add an exemption to the definition for the niche uses where non-flammable dusters are needed. HFC-134a is a non-flammable propellant, whereas HFC-152a is moderately flammable. The proposed exemption is for non-flammable products labeled exclusively to remove dust from equipment where dust removal is accomplished when: electric current exists; residual electrical potential from a component such as a capacitor exists; or an open flame exists. In addition, the product's "Principal Display Panel" must clearly contain the statement: "Energized Equipment use only." Additionally, to ensure that there are no increases in VOC or air toxics emissions, as a result of the proposed GWP limit, staff is proposing a 1 percent by weight VOC standard and a prohibition on the use of perchloroethylene and methylene chloride as mitigation measures as required by the California Environmental Quality Act (CEQA).

The GHG emission reductions from the Pressurized Gas Dusters were estimated using reported information from the 2003 Consumer Products Survey and the 2007 Pressurized Gas Duster Survey Update gathered during February 2008. During the public process of developing the proposed GWP limit, staff held numerous meetings and teleconferences to solicit information and comments from industry associations and industry representatives. At that time, industry representatives advised ARB staff that changes in the gas duster market had occurred since 2003. In response, staff conducted the 2007 Pressurized Gas Duster Survey Update to collect updated information.

The emissions and reduction estimates for 2010 and 2020 were grown from 2007 sales data and the state Department of Finance's population estimates. Annual population growth factors were calculated using the 2007 state population figures and the California Environmental Protection Agency's (Cal/EPA) Statewide Human Population Table found in the Population and Vehicle Trends Report (ARB, 2008d). It was assumed that without the proposed GWP limit for Pressurized Gas Dusters, the annual sales would grow proportionate to population growth. Staff used GWP values from the IPCC Climate Change 1995; The Science of Climate Change (IPCC, 1996) for calculating the CO₂ equivalent emissions and CO₂ equivalent reductions for this category of products.

Table VI-35 below summarizes the 2003 and 2007 sales and GHG emissions from Pressurized Gas Dusters based on the results of ARB's 2003 Survey (ARB, 2004a) and the 2007 Pressurized Gas Duster Survey Update (ARB, 2008c).

As shown in Table VI-35, 39 duster products were reported for 2003 with adjusted sales of 3,657 pounds per day for 2008. Although not shown on the table, Pressurized Gas Dusters had a sales-weighted average GHG content of over 99 percent by weight, with estimated GHG emissions of 2,242,171 CO₂e pounds per day, or about 0.37 MMT CO₂e per year in California.

**Table VI-35
Pressurized Gas Duster**

Survey Data	Product Form	Number of Products	2008 Category Sales (lbs/day)	2008 Adjusted GHG Emissions (CO₂e lbs/day)+
2003*	Aerosol	39	3,657	2,242,171
2007**	Aerosol	90	7,292	2,179,855

* Based on 2003 Consumer and Commercial Products Survey. (ARB, 2004a)

** Based on 2007 Pressurized Gas Duster Survey Update. (ARB, 2008c)

+ Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions).

Additionally, as shown in Table VI-35, 90 duster products were reported for 2007 with adjusted sales of 7,292 pounds per day for 2008. Although not shown in the table, the sales-weighted average GHG content is over 99 percent by weight, and the estimated adjusted GHG emissions are 2,179,855 CO₂e pounds per day, or about 0.36 MMT CO₂e per year.

Prior to 2003, industry leaders voluntarily shifted away from using HFC-134a as the propellant in gas dusters to using HFC-152a (CSPA, 2008). Changes in the market between 2003 and 2007 were captured in the 2007 Pressurized Gas Duster Survey Update (ARB, 2008c). In 2003, HFC-134a gas dusters made up approximately 41 percent of the market. The updated sales information shows that HFC-134a gas dusters were approximately 14 percent of the market in 2007, while HFC-152a gas dusters made up 85 percent of the market. This is why the 2008 adjusted GHG emissions have not increased proportionate to the category sales, which have nearly doubled. The potency of GHG emissions from this category have been decreasing with the increased use of HFC-152a.

Product Use and Marketing:

Pressurized Gas Dusters are aerosol sprays that produce a burst of pressurized gas that is used to remove dust, dirt, lint and other particles from a surface. Pressurized Gas Dusters differ from products such as "Electronic Cleaners" as they do not use liquids or solvents to remove dirt or grease.

These products are used in applications where no-touch, moisture-free, precision cleaning is needed, or in cleaning applications of hard to reach, hidden spots, in equipment and delicate instruments and their housings.

Pressurized Gas Dusters are used by “do-it-yourself” consumers, technicians, and professional engineers. These products are used in applications such as cleaning computers and other internal workings of equipment and delicate instruments, in addition to the surface of delicate materials such as photographic lenses, photographs, film, and negatives that require no-touch, moisture-free cleaning. They are often marketed as no residue, moisture-free, ultra pure or filtered to 0.2 micrometers, and plastics safe.

These products are labeled for cleaning delicate equipment such as: electronic, photographic and office equipment; laboratory equipment and medical devices; audio and video equipment; computer keyboards and printers, the inside of computer housings, copiers and TVs; disc drives, and tape heads of cassette players. These products are also used to clean delicate materials such as: photographs, photographic film, negatives, and slides; audio and video cartridges and cassettes, and other types of surfaces that cannot be cleaned with solvents. These products are sometimes labeled “For Industrial and Institutional Use Only.”

Pressurized Gas Dusters are sold in computer and electronic stores, mass market chain-stores, warehouse club stores, office supply stores, hardware stores, scientific or laboratory supply catalogs, and on the Internet.

Product Formulation:

Pressurized Gas Dusters are composed of 99 – 100 percent propellant. The propellant is typically a hydrofluorocarbon (HFC): HFC-134a or HFC-152a. A few products are composed of a blend of hydrocarbon propellants or a blend of hydrocarbon propellants, HFC-134a, and dimethyl ether (DME). Some formulations may contain a bittering agent (to prevent product misuse), or other additives at trace concentrations.

The GWP for products in this category is high due to the use of HFC-134a and HFC-152a. As mentioned previously, HFC-152a has a GWP of 140, which is one hundred and forty times greater than the GWP of carbon dioxide (CO₂). HFC-134a has a GWP of 1300, which is approximately ten times greater than the GWP of HFC-152a and 1300 times greater than CO₂ (IPCC, 1996; IPCC, 2007).

Proposed GWP Limit and Compliance:

We are proposing a GWP limit of 150 for any chemical compound used in Pressurized Gas Duster products, effective December 31, 2010. The GWP limit does not apply to any chemicals present as contaminants, which, in aggregate, are

0.1 percent by weight or less. The proposed GWP limit for Pressurized Gas Dusters is designed to be equivalent to reducing 0.20 MMT CO₂e per year, effective December 31, 2010, with HFC-134a emissions reductions of approximately 0.23 MMT CO₂e per year by 2020. The reductions in 2020 are important because AB 32 requires a reduction of GHG emissions equal to the 1990 baseline level in California by the year 2020.

We expect that compliance with the proposed limit will be achieved by substituting HFC-152a with a GWP of 140 for the HFC-134a propellant with a GWP of 1300. Pressurized Gas Dusters formulated with HFC-152a already exist on the market today.

As shown in Table VI-36a using adjusted 2007 emissions, we expect an estimated emission reduction of 1,198,574 CO₂e pounds per day, or about 0.20 MMT CO₂e tons per year, by 2010. The GWP limit was set at 150 rather than 140 because it is anticipated that GWP values may change as the “state-of-the-science” evolves. The GWP of HFC-152a (140) was used to estimate emission reductions.

Table VI-36a below shows the emission reductions from the GWP limit of 150 for this category, and that about 86 percent of the market currently complies with the limit.

Table VI-36a
Pressurized Gas Duster GHG Proposal

Survey Data	Proposed GWP Limit	Complying Products	Complying Market Share (%)	2010 Emission Reductions (CO₂e lbs/day)⁺	2020 Emission Reductions (CO₂e lbs/day)⁺
2003*	150	7/39	59	1,776,263	2,007,387
2007**	150	18/90	86	1,198,574	1,348,396

* Based on 2003 Consumer and Commercial Products Survey. (ARB, 2004a)

** Based on 2007 Pressurized Gas Duster Survey Update. (ARB, 2008c)

+ Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions).

Note: Emission reductions have been adjusted from 2003 to 2008 using a population growth factor.

Reformulation options that could be used by manufacturers to meet the proposed limit include the use of 100 percent HFC-152a. We are aware of some compressed CO₂ duster products available on the Internet. Staff initially considered a technology forcing, second tier lower limit of 10 for Pressurized Gas Dusters, effective December 31, 2015, based on CO₂ technology and new lower GWP refrigerant technology. However, after further investigation and discussions with manufacturers, staff believes that CO₂ (compressed gas) dusters are a different product than Pressurized Gas Dusters that use liquefied propellant. Dusters using CO₂, as they exist today, are not a commercially competitive product (DuPont & Falcon, 2004).

We are also aware of new lower GWP refrigerants in development. Indications are that these new refrigerants may have very low GWPs. The newly emerging

refrigerants are in the process of under going toxicity and safety testing, and the results are not yet available. The VOC status of these new refrigerants and their applicability for use as propellants in consumer products, particularly Pressurized Gas Dusters, is unknown at this time. Staff intends to work with Pressurized Gas Duster manufacturers, and other stakeholders to monitor new technologies and conduct a technical assessment of low-GWP propellants that might be appropriate for Pressurized Gas Dusters in the future.

Proposed VOC Limit and Compliance:

We are also proposing a 1 percent by weight VOC limit, effective December 31, 2010. The limit is designed to prevent the use of hydrocarbon propellants, and other VOCs, as products are reformulated to meet the 150 GWP limit. Hydrocarbon propellants (butane, propane, isobutane) may have lower GWPs, but contribute to the formation of ground-level ozone. As proposed, the VOC limit would also apply to any added fragrance. We believe the limit is feasible even if a small amount of fragrance is added. Therefore, we are proposing, in section 94510(c), that Pressurized Gas Dusters do not qualify for the two percent by weight fragrance exemption. The 1 percent limit is designed as a CEQA mitigation measure to prevent VOC emission increases. From the standpoint of cleaning shots and total cleaning force available per container and potential environmental impact, HFC-152a is more efficient than HFC-134a or CO₂ (DuPont & Falcon, 2004). As shown in Table VI-36b, using 2008 VOC emissions, the proposed limit will result in an estimated emission reduction of 1.0 pound per day, or about 0.0005 tons per day.

Table VI-36b also shows that more than 99 percent of the market currently complies with the proposed 1 percent VOC limit.

**Table VI-36b
Pressurized Gas Duster VOC Proposal**

Survey Data	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	2010 Emission Reductions (lbs/day)**
2007**	1.0	89/90	>99	1.0

** Based on 2007 Pressurized Gas Duster Survey Update. (ARB, 2008c)

+ Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions).

We expect products to be able to comply with both the VOC and GWP limits using HFC-152a. HFC-152a is negligibly reactive with respect to ozone formation and has been excluded from the definition of VOC. While ARB staff believes toxic air contaminants are not likely to be used in future reformulated products, ARB staff is proposing that perchloroethylene and methylene chloride be prohibited in the Pressurized Gas Duster category. This prohibition is proposed to ensure that manufacturers do not choose to reformulate with toxic chlorinated solvents in response to the new VOC and GWP limits. The prohibition does not apply to any chemicals

present as contaminants, which, in aggregate, are 0.1 percent by weight or less. Staff has determined that currently available formulation technologies that do not contain perchloroethylene or methylene chloride are readily available and thus they are not needed to comply with the proposed standard. See Chapter VIII for a discussion of the health effects of perchloroethylene and methylene chloride.

Issues:

- a. **Issue:** Industry recommends a narrow exclusion in the definition, for products that are completely nonflammable.

Response: The proposed modification to the definition of Pressurized Gas Duster includes a narrow exemption for products that are labeled exclusively to remove dust from equipment where dust removal is accomplished when: electric current exists; residual electrical potential from a component such as a capacitor exists; or an open flame exists. In addition, the “Principal Display Panel” must clearly contain the statement: “Energized Equipment use only.” [Title 17, CCR, Section 94508(a)(118)]

- b. **Issue:** Industry recommends that the GWP values contained in the IPCC 4th Assessment Report from 2007 be adopted, and that these GWP values be included in the regulation as a table.

Response: Staff acknowledges the comment. ARB’s policy is to use the IPCC: 1995 Second Assessment Report (IPCC, 1996) GWP values where they exist for a specific compound. If there is no SAR value, the 2007 Fourth Assessment Report (IPCC, 2007) GWP value shall be used. In the case where neither the SAR nor the FAR contain a GWP value for the specific compound, then the GWP value is assumed to be equal to the emission standard. These values are used to be consistent with other statewide and national Greenhouse Gas inventories (ARB, 2007c).

- c. **Issue:** Industry urges ARB to provide stable values over time while allowing updating as new materials are developed and new GWP values develop.

Response: See response to Issue #2 above.

- d. **Issue:** Industry urges ARB to ensure the proposed regulation (i.e., Table of GWPs) states clearly that compounds not listed as having a GWP value shall be considered to have a GWP value of 0.

Response: See response to Issue #2 above.

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VII. ECONOMIC IMPACTS

A. INTRODUCTION

This Chapter provides our analysis of the estimated economic impacts we predict from implementation of the proposed VOC limits, one global warming potential (GWP) limit, and other proposed amendments to the regulation. In general, economic impact analyses are inherently imprecise by nature, given the unpredictable behavior of companies in a highly competitive market such as consumer products. While staff has quantified the economic impacts to the extent feasible, some projections are necessarily qualitative, and based on general observations and facts known about the consumer products industry. This analysis, therefore, serves to provide a general picture of the economic impacts typical businesses subject to the proposed limits might encounter. Individual companies may experience different impacts than projected.

The overall impacts are first summarized in Section B. A description of specific aspects of the economic impacts then follows in the sections listed below:

- C.** Economic Impacts Analysis on California Businesses, Consumers, and Employment;
- D.** Analysis of Potential Impacts to California State or Local Agencies;
- E.** Analysis of the Cost-Effectiveness (CE) of the Proposed Limits;
- F.** Analysis of the Impacts to Raw Materials Cost;
- G.** Analysis of the Combined Impacts on Per-Unit Cost from Recurring and Nonrecurring Costs;
- H.** Other Possible Economic Impacts from Proposed Amendments; and
- I.** Mitigation of Potential Impacts through Additional Regulatory Flexibility.

It is important to note that we conducted this economic impacts analysis in accordance with the current legal requirements under the Administrative Procedure Act (APA). This analysis uses similar methodologies and assumptions as were used in the last four major consumer products rulemakings, the “Mid-Term Measures” regulations adopted by the Board in 1997, 1999, and in the 2004 and 2006 amendments to the regulation (ARB, 1997b; ARB, 1999; ARB, 2004b; ARB, 2006a). However, we have used updated methodologies to determine the high cost estimates for nonrecurring costs as was done in the 2004 and 2006 amendments (ARB, 2004b; ARB, 2006a). We have determined a likely high cost scenario specific to each category. See Section G of this Chapter for a detailed description of the nonrecurring cost determination methodology.

B. SUMMARY OF FINDINGS

Overall, most affected businesses will be able to absorb the costs (or will likely pass through some of the costs to the consumer) of the proposed limits and requirements with no significant adverse impacts on their profitability. This finding is indicated by the staff's estimated change in "return on owner's equity" (ROE) analysis. The analysis found that the overall change in ROE ranges from a low of 0.7 percent to a high of about 4.0 percent, with an average change in ROE of about 2.5 percent. However, the proposed measures may impose economic hardship on some businesses with very little or no margin of profitability. These businesses, if hard pressed, can seek relief under the variance provision of the consumer products regulation for extensions to the compliance dates. Such extensions may provide sufficient time to minimize the cost impacts to these businesses. Because the proposed measures would not significantly alter the profitability of most businesses, we do not expect a noticeable change in employment; business creation, elimination or expansion; and business competitiveness in California. We also found no significant adverse economic impacts to any local or State agencies.

Our analysis shows that the CE of the proposed amendments is higher than other existing VOC ARB regulatory programs. This is not surprising given that many categories proposed for regulation are smaller, in terms of emissions, and therefore, smaller emissions reductions result. We estimate the total overall CE of the proposed VOC limits and other requirements to be about \$6.23 per pound of VOC reduced. We have also determined the CE of the proposed GHG limit relative to reducing carbon dioxide emissions. We estimate the CE of the proposed GHG limit for Pressurized Gas Dusters to be \$0.22 per metric ton of CO₂ equivalent (MT CO₂e) reduced.

We estimate that the total cost incurred by industry to comply with this regulation is about \$26 million per year for 10 years. These cost estimates are based on assumptions specific to each category depending on reformulation needs, and represent the mid-range of the cost estimates. Staff believes the mid-range costs are the most likely to be incurred by industry to comply with the proposed limits. For some categories, it was assumed that manufacturers would either drop certain products or undergo minor product formulation changes, and for other categories manufacturers would undergo complete production line overhaul and equipment replacement rather than simple re-tooling.

One way to estimate the potential change in cost to produce a product is to determine the change in raw materials cost, which generally has the biggest influence on product cost for most product categories. Our analysis indicates that reformulations to comply with the proposed limits can result in raw material changes ranging from negligible cost (net savings or no cost) up to a cost increase of about \$0.63 per unit. The value of \$0.63 represents the maximum, worst case, per-unit cost increase. This range compares favorably to the change in per unit cost projected for the Phase I and II, the Mid-Term Measures I and II regulations and the 2004 and 2006 Amendments. The analysis assumed the present cost for raw materials; these costs may be lower or

higher at the time of the limit effective date depending on the formulations chosen by manufacturers and the future price of raw materials. To the extent that the projected cost savings or increases are ultimately passed on to the consumer, the actual retail price of products after the proposed limits become effective may be higher or lower than suggested by this analysis.

Even if all annualized nonrecurring costs (research and development, capital equipment purchases, etc.) and recurring raw material cost increases are factored into the affected products manufacturing costs, the potential increase in production per-unit costs are comparable to previous ARB consumer product rulemakings. The estimated per-unit cost increases from both annualized nonrecurring and annual recurring costs range from negligible cost (net savings or no cost) to about \$2.05 per unit. The value of \$2.05 represents the maximum, worst case, per-unit cost increase for a product which is typically packaged in a one gallon container. When averaged over the total number of unit sales in California of noncomplying products, (those that need to reformulate) the product weighted average cost increase is about \$0.20 per unit. As noted before, these per unit cost increases compare favorably to the change in per unit cost projected for previous ARB consumer product rulemakings.

Staff believes that the regulation cost and CE determination methodologies are quite conservative, and are thus in most cases, over-estimated. There are several factors that contribute to the over estimation of costs. The mid-range cost, (used to determine the overall cost and cost effectiveness of the regulation) is the average of the estimated high and low cost scenarios. The low cost scenario assumes that companies would choose the lowest cost reformulation pathway, making minor adjustments to a product's formulation, or simply eliminating higher VOC products. We believe that most manufacturers would choose the lowest cost reformulation option. For the high cost scenario, it is assumed that there is significant research and development, and new equipment is needed to reformulate the product. We believe that few manufacturers would need to take the high cost reformulation approach.

In the economic analysis, staff assumed that the VOC limits for Multi-purpose Lubricants would be the most challenging and costly to comply with. Staff separately calculated the estimated costs of reformulation for each of the proposed tiers of the Multi-purpose Lubricant proposal. Further, cost estimates were performed separately for aerosol and non-aerosol products respectively. The analysis shows that greater costs will be incurred during the first tier reformulation than the second tier reformulation. This results from the assumption that significant high end costs will be incurred in the first tier reformulation, but not all of these costs would necessarily be duplicated in the second tier reformulation. If major plant modifications or new equipment purchases are needed to meet either tier of the VOC limits, a manufacturer would likely choose to make these significant changes during one plant modification, rather than making significant more than once. In fact, certain companies may choose to reformulate only once, (i.e. reformulate to meet the second tier VOC limit before 2013.) Regardless of whether this assumption is correct, we believe that it is appropriate to assume that high end reformulation costs will be incurred during either

the first tier reformulation or the second tier reformulation, but not both. Either assumption, that higher costs would be incurred during a given tier relative to the other, would yield the same amount of total costs being incurred to meet both tiers.

Another factor that can contribute to an over estimation of costs are the assumptions used for the raw ingredient costs. For the product categories for which VOC limits are proposed, we assumed that if the raw ingredients used in the reformulated product yielded a cost savings, the cost of the raw ingredients necessary to meet the new VOC limit is zero. This is a conservative assumption because for most product categories, there is more than one reformulation option. However, it is possible that a given manufacturer will choose more expensive ingredients to preserve certain specific product attributes.

However, in the case of Pressurized Gas Dusters we assumed that reformulation would yield a raw ingredient savings, and incorporated the decreased cost into the overall cost estimate. We believe that this approach is appropriate because in order to comply with the proposed GWP limit for Pressurized Gas Dusters, there is only one identified reformulation pathway, replacing HFC-134a with HFC-152a. Because HFC-152a is less expensive per pound than HFC-134a, it is appropriate that there would be a cost savings in virtually every case. Therefore, for Pressurized Gas Dusters, instead of assuming that the raw material cost is zero, the raw material cost savings was subtracted from the anticipated equipment and research and development costs of reformulation.

C. ECONOMIC IMPACTS ANALYSIS ON CALIFORNIA BUSINESSES, CONSUMERS, AND EMPLOYMENT

1. Legal Requirements

Section 11346.3 of the Government Code requires State agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulation. The assessment must include a consideration of the impact of the proposed regulation on California jobs; business expansion, elimination or creation; and the ability of California business to compete with businesses in other states.

Also, State agencies are required to estimate the cost or savings to any State or local agency and school district in accordance with instructions adopted by the Department of Finance. The estimate shall include any nondiscretionary cost or savings to local agencies and the cost or savings in federal funding to the State.

2. Potential Impact on California Businesses

Overall, most affected businesses will be able to absorb the costs of the proposed measures with no significant adverse impacts on their profitability. It is likely that all cost will not be absorbed by businesses, by passing a portion through to

consumers. However, the proposed measures may impose economic hardship on some businesses with very little or no margin of profitability. These businesses, if hard pressed, can seek relief under the variance provision of the consumer products regulation for extensions to their compliance dates. Such extensions may provide sufficient time to minimize the cost impacts to these businesses. Additional mitigation may be achieved by taking advantage of the compliance flexibility offered by the existing Innovative Product Provision (IPP) and the Alternative Control Plan (ACP) Regulation (see Subsection I of this Chapter). Because the change on the return on owners' equity (ROE) has been determined to be quite low, the proposed measures would not significantly alter the profitability of most businesses. Further, we do not expect a noticeable change in employment; business creation, elimination or expansion; and business competitiveness in California.

a. Return on Owners' Equity

This portion of the economic impacts analysis is based on a comparison of the ROE for affected businesses before and after inclusion of the cost to comply with the proposed requirements. The data used in this analysis are obtained from Dun and Bradstreet Industry Norms and Key Business Ratio (D&B, 2006-2007), the ARB's 2003 Consumer and Commercial Products Survey (2003 Survey), and the staff's CE analysis discussed later in this Chapter.

b. Affected Businesses

Any business which manufactures or markets consumer products subject to the proposed new limits and requirements can be directly affected by this regulation. Also potentially affected are businesses which supply raw materials or equipment to manufacturers or marketers, and those that distribute or sell consumer products in California. The focus of this analysis, however, will be on manufacturers, marketers, and distributors that are most affected by the proposed measures.

The consumer products subject to the proposed measures are manufactured, marketed, or distributed by a large number of companies worldwide. According to the 2003 Survey, there are about 300 companies that market the affected products in California. These companies manufacture, market, and distribute a broad range of solvent, adhesive, household, and personal care products, including an estimated total of 2,366 complying and 1,535 noncomplying products (based on reported figures). Of the companies manufacturing these products, about 60 firms (mostly medium- or small-sized firms) are located in California.

These 300 companies fall primarily into 5 North American Industry Classification System codes (NAICS). A list of these industries which we have been able to identify is provided in Table VII-1. As shown in Table VII-1, the industries with the most noncomplying products fall under the NAICS for Lubricant Manufacturing; Adhesive Manufacturing; Polish and Other Sanitation Good Manufacturing, Toilet Preparation

Manufacturing and All Other Miscellaneous Chemical Product and Preparation Manufacturing.

Table VII-1
Industries with Businesses Potentially Affected by the Proposed Limits

NAICS*	Industry	Number of Product Categories*	Number of Noncompliant Products**	Includes:
324191	Lubricant Manufacturing	2	226	Multi-Purpose Lubricant – excluding solid & semisolid; Penetrant
325520	Adhesive Manufacturing	2	271	Sealant or Caulking Compound – Chemically Curing; Sealant or Caulking Compound – Non-Chemically Curing
325612	Polish & Other Sanitation Good Manufacturing	10	637	Carpet/Upholstery Cleaner; Dusting Aid; Fabric Protectant; Fabric Softener – Single Use Dryer Product; Floor Maintenance Product; Floor Polish or Wax; Glass Cleaner; Odor Remover/Eliminator; Pressurized Gas Duster; Spot Remover
325620	Toilet Preparation Manufacturing	2	498	Astringent/Toner (non-FDA regulated); Personal Fragrance Product – 20% or less fragrance
325998	All Other Miscellaneous Chemical Product & Preparation Manufacturing	3	140	Motor Vehicle Wash; Tire or Wheel Cleaner; Windshield Water Repellent

*As reported in the 2003 Consumer and Commercial Products Survey. (ARB, 2004a)

** Some noncomplying products may relate to more than one NAICS code. Number of products may be different than those indicated in Table VII-5, due to calculations based on representative product size.

c. Study Approach

This study covers 5 industries with at least 300 affected businesses. The approach used in evaluating the potential economic impact of the proposed measures on these businesses is as follows:

- (1) A typical business from each product category was selected from the 2003 Survey respondents.
- (2) A range of compliance costs were estimated for each affected product category. The mid-range cost for each category was used in this analysis.
- (3) Compliance cost to a typical business was then estimated based on a weighted average of all product category costs in an affected industry.
- (4) Estimated cost was adjusted for federal and State taxes.
- (5) The Return on Owner's equity (ROE) was calculated for each of these businesses by dividing the net profit by the net worth. The adjusted cost was then subtracted from net profit data. The results were used to calculate an adjusted ROE. The adjusted ROE was then compared with

the ROE before the subtraction of the cost to determine the potential impact on the profitability of the business.

A reduction of more than 10 percent in profitability is considered to indicate a potential for significant adverse economic impacts. This value has been used consistently by the ARB staff to determine impact severity (ARB, 1990c; ARB, 1991a; ARB, 1995; ARB, 1997b; ARB, 1999; ARB, 2004b; and ARB, 2006a). This threshold is consistent with the thresholds used by the U.S. EPA.

d. Assumptions

This study uses 2004-2006 Dun and Bradstreet financial data for a nationwide typical business in each affected industry except for Toilet Preparation Manufacturing and All Other Miscellaneous Chemical Product and Preparation manufacturing where 2005 and 2004-2005 Dun and Bradstreet financial data were used, respectively, due to lack of complete financial data. These data were used to calculate the ROEs before and after the subtraction of the compliance costs for a typical business in each industry listed in Table VII-1. The calculations were based on the following assumptions:

- (1) A typical business on a nationwide basis in each industry is representative of a typical California business in that industry;
- (2) All affected businesses were subject to federal and State tax rates of 35 percent and 9.3 percent respectively; and
- (3) Affected businesses are not able to increase the prices of their products, nor can they lower their costs of doing business through short-term cost-cutting measures.

Given the limitation of available data, staff believes these assumptions are reasonable for most businesses at least in the short run; however, they may not be applicable to all businesses.

e. Results

Typical California businesses are affected by the proposed new limits to the extent that the implementation of these requirements would change their profitability. Based on our assessment of the proposed limits' CE (see Subsection E of this Chapter), we estimate the per-business compliance costs to range from about \$1,700 (low cost for typical Penetrant manufacturer) to about \$54,000 per year (high cost for typical Multi-Purpose Lubricant manufacturer) as shown in Table VII-2. Table VII-7 also shows total mid-range, per product cost of about \$14,000 per year.

Table VII-2. Estimated Total Impacts to Businesses from Both Annualized Non-Recurring and Annual Recurring Costs

		Estimated Annual Costs, Dollars Per Year (Includes Recurring and Nonrecurring)									
Category	Adhesives	Estimated # Products Non-Compliant	Number of Companies with Noncompliant Products in Each Product Category	For a Typical Business in the Product Category			For All Businesses in the Product Category				
				Low Cost	High Cost	Mid Cost	Low Cost	High Cost	Mid Cost		
Chemically Curing Sealant or Caulking Non-chemically Curing Sealant or Caulking Total	Automotive	112	30	\$22,507	\$54,479	\$38,493	\$675,207	\$6,101,648	\$3,388,428		
		159	37	\$7,419	\$23,678	\$15,548	\$274,486	\$3,764,857	\$2,019,677		
		271	67				\$949,693	\$9,866,505	\$5,408,099		
Motor Vehicle Wash Windshield Water Repellent Tire or Wheel Cleaner Aerosol Non-aerosol Total		61	26	\$4,856	\$7,089	\$5,973	\$126,263	\$432,425	\$279,344		
		30	8	\$6,296	\$6,296	\$6,296	\$50,371	\$188,891	\$119,633		
		6	5	\$2,037	\$2,104	\$2,070	\$10,184	\$12,623	\$11,404		
43	18	\$4,011	\$4,011	\$4,011	\$72,198	\$172,474	\$122,336	\$114,004			
140	57						\$259,015	\$806,413	\$532,714		
Household Care	Carpet/Upholstery Cleaner	58	34	\$4,357	\$27,966	\$16,167	\$148,133	\$1,621,475	\$884,804		
		70	40	\$4,470	\$11,629	\$8,049	\$178,781	\$814,034	\$496,408		
		32	19	\$4,302	\$7,448	\$5,875	\$81,729	\$238,335	\$160,032		
Non-aerosol	Dusting Aid	10	8	\$3,193	\$5,528	\$4,360	\$25,540	\$55,278	\$40,409		
		32	16	\$3,671	\$5,847	\$4,759	\$58,742	\$134,482	\$96,612		
		7	4	\$4,470	\$5,877	\$5,173	\$17,878	\$41,136	\$29,507		
Fabric Softener (single use dryer product) Floor Maintenance Product (Spray Buff) Floor Polish or Wax (Wood Floor Wax) Glass Cleaner (aerosol) Multi-Purpose Lubricant		46	30	\$3,916	\$6,128	\$5,022	\$117,485	\$281,891	\$193,688		
		6	3	\$11,912	\$35,790	\$23,851	\$35,735	\$214,741	\$125,238		
		70	56	\$3,193	\$9,755	\$6,474	\$178,781	\$682,845	\$430,813		
Aerosol - Tier 1 Aerosol - Tier 2 Non-aerosol - Tier 1 Non-aerosol - Tier 2 Odor Remover/Eliminator (non-aerosol) Penetrant		122	60	\$5,284	\$54,288	\$29,786	\$317,051	\$6,623,117	\$3,470,084		
		144	62	\$3,350	\$29,989	\$16,670	\$207,727	\$4,318,431	\$2,263,079		
		19	10	\$4,836	\$45,426	\$25,131	\$48,361	\$863,095	\$455,728		
Aerosol Non-aerosol Spot Remover Aerosol Non-aerosol Total		20	10	\$4,586	\$12,581	\$8,583	\$45,855	\$251,618	\$148,733		
		33	27	\$1,619	\$11,070	\$6,344	\$43,702	\$365,311	\$204,507		
		50	32	\$2,993	\$40,128	\$21,561	\$95,776	\$2,006,411	\$1,051,093		
Pressurized Gas Duster Spot Remover Aerosol Non-aerosol Total		12	10	\$1,703	\$27,470	\$14,586	\$17,027	\$329,638	\$173,333		
		80	20	-\$1,441	\$10,216	\$4,388	-\$115,269	\$204,321	\$44,526		
		58	41	\$3,613	\$23,284	\$13,448	\$148,133	\$1,350,459	\$749,296		
144	56	\$6,567	\$17,088	\$11,828	\$367,778	\$2,460,613	\$1,414,196	\$749,296			
1004	538						\$2,018,946	\$22,857,231	\$12,438,089		
Personal Care	Astringent/Toner (Non-FDA regulated) Personal Fragrance Product Aerosol Non-aerosol Total	29	15	\$3,978	\$14,402	\$9,190	\$59,665	\$417,653	\$238,659		
		16	3	\$10,973	\$10,973	\$10,973	\$32,918	\$175,565	\$104,242		
		453	62	\$15,032	\$30,929	\$22,980	\$932,003	\$14,010,634	\$7,471,319		
498	80						\$1,024,587	\$14,603,852	\$7,814,219		
1913	742						\$4,252,241	\$48,134,001	\$26,193,121		

* Estimated number of non-compliant products is calculated based on sales and representative product size. As such, the values are different from the number of products reported in the 2003 Survey.

Using ROE to measure profitability, we found that the average ROE of sample businesses in affected industries declined by about 2.5 percent as shown in Table VII-3. This represents a minor change in the average profitability of typical businesses in California.

Table VII-3
Changes in Return on Owner's Equity (ROEs) for Typical Businesses in Affected Industries

NAICS*	Industry	% Change in ROE
324191	Lubricant Manufacturing	2.8
325520	Adhesive Manufacturing	4.0
325612	Polish & Other Sanitation Good Manufacturing	2.8
325620	Toilet Preparation Manufacturing	2.4
325998	All Other Miscellaneous Chemical Product & Preparation Manufacturing	0.7
Average		2.5

Note: Changes in ROE mean change or difference; all changes in ROEs shown are negative (i.e., shows a decline in profitability).

As shown in Table VII-3, the projected change in profitability of typical businesses in the 5 affected industries varies by industry sector. Within the NAICS shown, the predicted change (decline) in profitability of a typical business ranged from a high of about 4.0 percent to a low of 0.7 percent. This variation in the impact of the proposed measures can be attributed primarily to two factors. First, some businesses incur higher costs due to the type of products or the number of noncompliant products they manufacture or market. For instance, the estimated annualized costs for typical businesses in each affected industry ranged from a high of approximately \$35,000 to a low of about \$5,000. These values are a product weighted average cost of the respective annualized costs for all products. Second, the performance of businesses may differ from year to year. Hence, the financial data used may not be representative of an average-year performance for some businesses.

The potential impacts to businesses' ROEs may be overestimated for the following reasons. First, annualized costs of compliance are estimated using, in part, the current prices of raw materials. Raw material prices usually tend to rise as oil prices increase, but tend to fall as higher demand for these materials induces economy of scale production in the long run. Second, affected businesses would not absorb all of the increase in their costs of doing business. They may be able to either pass some of the cost on to consumers in the form of higher prices, reduce their costs, or do both.

In this analysis, as in 2004 and 2006, we allocated nonrecurring reformulation costs only to the noncomplying products.

3. Potential Impact on Business Creation, Elimination or Expansion

The proposed measures would have no noticeable impact on the status of California businesses. This is because the reformulation costs are not expected to impose a significant impact on the profitability of businesses in California. However, some small businesses with little or no margin of profitability may lack the financial resources to reformulate their products on a timely basis. Should the proposed measures impose significant hardship on these businesses, temporary relief in the form of a compliance date extension under the variance provision may be warranted.

On the other hand, the proposed measures may provide business opportunities for some California businesses or result in the creation of new businesses. California businesses which supply raw materials and equipment or provide consulting services to affected industries may benefit from increased industry spending on reformulation.

4. Potential Impact on Business Competitiveness

The proposed measures would have no significant impact on the ability of California businesses to compete with businesses in other states. Because the proposed measures would apply to all businesses that manufacture or market certain consumer products regardless of their location, the staff's proposal should not present any economic disadvantages specific to California businesses.

Nonetheless, the proposed measures may have an adverse impact on the competitive position of some small, marginal businesses in California if these businesses lack resources to develop commercially acceptable products in a timely manner. As stated above, such impacts can be mitigated to a degree with a justifiable compliance extension under the variance provision of the Consumer Products Regulation, or through additional regulatory flexibility afforded by the IPP or the ACP Regulation (see Subsection H).

5. Potential Impact on California Consumers

The potential impact of the proposed measures on consumers depends upon the ability of affected businesses to pass on the cost increases to consumers. In the short run, competitive market forces may prevent businesses from passing their cost increases on to consumers. Thus, we do not expect a significant change in retail prices in the short run. In the long run, however, if businesses are unable to bring down their costs of doing business they will likely pass their cost increases on to consumers.

To estimate the price increase, we adjusted per unit compliance costs for each affected industry by its profit margin as provided by Dun and Bradstreet. Assuming affected industries will pass on the entire compliance costs to consumers in terms of higher prices, we estimate the average price of a product would increase by about \$0.03 per unit. Product price increases, however, would vary from industry to industry. They would range from a low of \$0.01 per unit of the products sold by the Personal

Care Products Industry to a high of about \$0.05 per unit of the products sold by Household Care Products.

The proposed measures may also affect consumers adversely if they result in reduced performance attributes of the products. However, this scenario is unlikely to occur for the following reasons. First, for nearly every proposed limit, there are already complying products that represent significant market share in many of their respective categories. Thus, the industry already has the technology to manufacture compliant products that satisfy consumers. Second, marketers are unlikely to introduce a product which does not meet their consumers' expectations. This is because such an introduction would be damaging not only to the product sale, but also to the sale of other products sold under the same brand name (impairing so-called "brand loyalty"). Finally, the Board has provided flexibility, under the existing consumer products program, to businesses whose situations warrant an extension to their compliance dates. For companies that can justify such variances, the additional time may afford more opportunity to explore different formulation, cost-cutting, performance-enhancing, or other marketing strategies which can help make the transition to new complying products nearly transparent to consumers.

6. Potential Impact on California Employment

The proposed measures are not expected to cause a noticeable change in California employment and payroll. According to the U.S. Department of Commerce, California employment in industries affected by the proposed measures was 13,885 in 2005, as shown in Table VII-4, or about 9.7 percent of national employment in the affected industries. This represents less than 1 percent of manufacturing employment in California. These employees working in the 458 establishments generated about \$667 million in payroll, or about 9.4 percent of national payroll in the affected industries. This also accounts for less than 1 percent of the total California manufacturing payroll in 2005.

D. ANALYSIS OF POTENTIAL IMPACTS TO CALIFORNIA STATE OR LOCAL AGENCIES

We have identified two State agencies that could/or would be impacted. The California Prison Industry Authority (PIA) manufactures and markets consumer products for use in State service. This is the only State agency we are aware of that makes consumer products. The PIA manufactures a drain maintainer, which could be subject to the proposed six percent limit for non-aerosol Odor Remover/Eliminator. This product, if subject, would meet the proposed new limit for Odor Removers/Eliminators. The PIA also sells bar soaps, powder bleaches, liquid glass cleaners, liquid multipurpose cleaner and degreasers, floor finishes, and liquid and powder detergents (PIA, 2008). The proposed measures do not affect these categories and, as such, will not have an impact on the PIA.

**Table VII-4
California Employment and Payroll in Affected Industries**

NAICS	Number of Employees		Payroll	
	California	CA Share as % of US	California (million in 2005\$)	CA Share as % of US
324191	720	5.4	39,807	5.5
325520	2,452	11.9	130,584	12.4
325612	1,081	6.0	44,846	5.2
325620	7,542	13.3	346,387	13.2
325998	2,090	5.9	105,257	5.9
Total	13,885	9.7	666,881	9.4

Source: (U.S. Census, 2005)

The Air Resources Board (ARB) would have costs associated with adoption of the proposed amendments. Adoption of the amendments would necessitate an increase in ARB staff to properly enforce the Consumer Products Regulation. These proposed amendments are setting new limits for a number of previously unregulated categories. It has been determined that to enforce these new limits, two ARB staff will be needed. This would result in an increased cost to the State of approximately \$300,000 per year.

E. ANALYSIS OF THE COST-EFFECTIVENESS (CE) OF THE PROPOSED LIMITS

1. Introduction

In the following analysis, we evaluated the anticipated CE of the proposed new limits. Such an evaluation allows us to compare the efficiency of the proposed limits in reducing a pound of VOC or a metric ton of CO₂e relative to other existing regulatory programs. To do this, we applied a well-established methodology for converting compliance costs, both nonrecurring and recurring, to an annual basis. We then report the ratio of the annualized costs to the annual emission reductions in terms of “dollars (to be) spent per pound of VOC reduced or metric ton of CO₂e reduced in the case of Pressurized Gas Duster. For perspective, we compare the estimated cost-effectiveness of the proposed limits to the cost-effectiveness of other ARB regulations and control measures.

2. Methodology

The CE of a reduction strategy is generally defined as the ratio of total dollars to be spent to comply with the strategy (as an annual cost) to the mass reduction of the pollutant(s) to be achieved by complying with that strategy (in annual pounds or metric tons). Annual costs include annualized nonrecurring fixed costs (e.g., total research and development (R&D), product and consumer testing, equipment purchases/modifications, etc.) and annual recurring costs (e.g., raw materials, labeling, packaging, etc.).

We annualized nonrecurring fixed costs using the Capital Recovery Method, as recommended under guidelines issued by the California Environmental Protection Agency (Cal/EPA). Using this method, we multiply the estimated total fixed costs to comply with the limits by the Capital Recovery Factor (CRF) to convert these costs into equal annual payments over a project horizon (i.e., the projected useful life of the investment) at a discount rate. We then sum the annualized fixed costs with the annual recurring costs and divide that sum by the annual emission reductions to calculate the cost-effectiveness of the regulation, as shown by the following general equation:

$$\text{Cost-Effectiveness} \quad (1)$$

$$= \frac{(\text{Annualized Fixed Costs}) + (\text{Annual Recurring Cost})}{(\text{Annual Mass Reduction in VOC})}$$

where:

$$\text{Annualized Fixed Costs} = (\text{Fixed Costs}) \times \frac{i(1+i)^n}{(1+i)^n - 1} \quad (2)$$

$$\begin{aligned} \frac{i(1+i)^n}{(1+i)^n - 1} &= \text{Capital Recovery Factor (CRF)} \\ i &= \text{discount interest rate over project horizon, \%} \\ n &= \text{number of years in project horizon} \\ \text{Fixed Costs} &= \text{total nonrecurring cost per product category} \\ &= (\text{Nonrecurring Cost per Product}) \times (\text{Total Noncompliant Products in the Category}) \end{aligned}$$

As shown by the raw materials cost analyses in Appendix D, a convenient method for estimating the annual recurring cost portion of overall cost-effectiveness is to separate Equation (1) into two fractions, one for the nonrecurring costs and one for the recurring costs. It can then be shown that the CE fraction for recurring costs can be simplified and calculated as follows:

$$\text{Annual Recurring Costs CE} = \frac{(\text{Compliant Materials Cost}) - (\text{Baseline Materials Cost})}{(\text{Baseline VOC Content}) - (\text{Compliant VOC Content})} \quad (3)$$

where,

Baseline Materials Cost	=	cost of raw materials for product before reformulation to the proposed limit \$/lb product
Baseline VOC Content	=	product VOC weight fraction before reformulation to limit, lb VOC/lb product
Compliant Materials Cost	=	cost of raw materials for compliant product, \$/lb product
Compliant VOC Content	=	product VOC weight fraction of compliant product, lb VOC/lb product.

In the case of Pressurized Gas Duster, the calculations are similar except that in place of VOC content, product GWP value content is used. To use Equation (3), staff determined typical VOC or GWP value content of both compliant and noncompliant products in each of the product categories/subcategories, based on sales data and the speciated formulations as reported by manufacturers in the ARB's 2003 Survey. To the extent feasible, staff determined the detailed formulations that most closely reflect the "typical" compliant and noncompliant VOC or GWP value contents. These formulations, in turn, were designated as compliant and baseline formulations, respectively (See Appendix D).

For most ingredients, we used the most recent, distributor-level bulk prices from the *ICIS Chemical Business* web site (ICIS, 2008). Costs for other ingredients were obtained from discussions with chemical suppliers, or from web searches of analytical grade chemicals. All of these data sources were used to calculate the baseline and compliant material costs based on these designated formulations shown in Appendix D. Inorganic compounds were assigned a low and high cost of \$0.09 and \$0.91 per pound based on the costs found of the most common inorganic compounds found in the product categories. Other unspecified ingredients or ingredients for which prices were unknown were grouped into an "all others" classification and assigned a default low and high cost of \$3.50 and \$7.00 per pound, respectively (ARB, 1997c). These analyses are shown in Appendix D and discussed in more detail in "Analysis of Impacts to Raw Materials Cost" later in this section.

We used a very similar methodology to determine the CE of the proposal to reduce the potency of greenhouse gas emissions from Pressurized Gas Dusters, as described above. Instead of evaluating costs relative to VOC reductions, for Pressurized Gas Dusters we evaluated the costs of reducing GHG emissions equivalent to reducing a metric ton of carbon dioxide.

3. Assumptions

We calculated the CE with an assumed project horizon of 10 years, a commonly cited period for an investment's useful lifetime in the chemical processing industry. We also assumed a fixed interest rate of 10 percent throughout the project horizon. These assumptions are conservative and constitute standard practice in CE analyses of air pollution regulations, including previous consumer product rulemakings. Based on these assumptions, the Capital Recovery Factor (CRF) is 0.16275.

For this rulemaking, we assumed products reformulated to meet the proposed limits will be marketed throughout the U.S. by national marketers (ARB, 1997b). We earlier determined that businesses generally formulate for, and distribute to the entire nation, products compliant with our regulations rather than incurring the additional cost of setting up a California specific product distribution system. We believe the same strategy will be employed by companies subject to the proposed new limits. We, therefore, assumed in the Midterm II analysis in 1999 that, for the annualized fixed cost portion of Equation (1), it was appropriate to use the fixed cost for national production divided by the national emission reductions.

However, an alternative but equivalent approach, which we used in the 2004 and 2006 analyses, and in this analysis, is to report the California-apportioned (by population) annualized fixed cost divided by the California-apportioned emission reductions. To illustrate, a manufacturer may need to install \$10 million worth of equipment to produce its national sales volume of products compliant with the proposed limits. However, if the company were to produce a California and 49-state product, the company may only need to install \$1 million worth of equipment to produce unit sales sufficient for the smaller California market. Using this alternative approach, we discounted the total fixed costs for producing national sales volumes by the California-apportionment factor (i.e., the current ratio of California to U.S. population, or 12.5 percent (CA DOF, 2007)), which we then divided by the California-only emission reductions. It is important to note that, while both of the approaches described above -- the national marketing and California-only approaches -- reach the same conclusion, they do so for different reasons as discussed above.

For the annual recurring costs, we assumed compliant reformulations would result in cost changes as a result of changes in a product's raw materials and their associated prices. Changes in packaging, labeling, distribution and other recurring costs were assumed to be negligible relative to baseline levels of these costs. This assumption is based on our previous regulatory experiences. To illustrate, in 1996, we conducted a comprehensive technical assessment of the 55 percent by weight VOC hairspray limit, which required extensive reformulations to existing products (ARB, 1997c). The hairspray limit is generally considered to be among the most challenging of the consumer product limits; it likely resulted in more changes to the regulated product, relative to pre-regulatory products, than any other VOC limit. However, our assessment found that changes to recurring costs other than hairspray raw material costs were expected to be negligible (ARB, 1997c). Based on this finding and because the

proposed new limits are designed to preserve product forms, we believe our assumptions regarding the recurring costs are reasonable.

4. Results

A review of relevant technical literature and industry trade journals provided little information that we could use to estimate costs directly. This is not surprising, because the consumer products industry is very competitive, and production cost data specific to a company are closely-guarded trade secrets. We have received significant comments regarding our assumptions for fixed costs from specific interested parties. We worked with these industry representatives to obtain new, updated, substantiated fixed cost data. The information we received generally confirms our cost assumptions to be correct. We therefore developed estimates for the nonrecurring costs based on analogous costs reported by ARB staff for the Phase II consumer products rulemaking (*Id*, Appendix D1). The Phase II nonrecurring costs are applicable for this analysis since they were based on staff's detailed estimates of labor, research and development, equipment purchase, and other costs involved in product reformulations for generic household, automotive, and personal care categories, all of which are impacted by proposed limits. This is the same approach we used for the 1997 Mid-Term Measures rulemaking, the 1999 Mid-Term Measures II rulemaking, and the 2004 and 2006 rulemakings.

The Phase II nonrecurring investment costs, reported in 1991 dollars, were adjusted to 2007 dollars using a well-established method of ratioing chemical engineering plant cost indices as follows (Peters and Timmerhaus, 1980):

$$\text{Non - Recurring Costs (in 2007 dollars)} = \frac{\text{Non - Recurring Costs (in 1991 dollars)}}{10} \times \frac{\text{C.E. 2007 Index}}{\text{C.E. 1991 Index}} \quad (4)$$

where,

CE 2007 index = 2007 Chemical Engineering Plant Cost Index = 525.0
(*Chemical Engineering*, April 2008).

CE 1991 index = 1991 Chemical Engineering Plant Cost Index = 361.3
(*Chemical Engineering*, April 1997).

We believe the original Phase II cost estimates were beneficial at the time of the rulemaking for predicting the costs to comply with those limits. However, it was discovered during Midterm II that these original cost estimates grossly overestimated the true nonrecurring costs for Phase II by a factor of ten (ARB, 1999, *op cit.* at Vol II, Chapter VII, Page 211). We therefore estimated the nonrecurring costs for the proposed new limits by adjusting the Phase II estimates to be consistent as shown in Equation (4).

Table VII-5 shows our estimates for per-product and total annualized nonrecurring costs for each of the product categories/subcategories subject to the proposed limits.

As shown, we project a per-product annualized nonrecurring cost ranging from a low of about \$8,000 to a high of about \$243,000. With 1,535 noncompliant products that would need to be reformulated, the overall total annualized fixed cost to industry is projected to range from about \$4 million to just about \$16 million dollars per year, with a general breakdown of this range as follows: automotive care products (2 percent), household care products (72 percent), personal care products (16 percent) and adhesives (10 percent).

Our analysis shows that the CE of the proposed requirements is higher than the CE of other rulemakings for consumer products or the Suggested Control Measure for Architectural and Industrial Maintenance Coatings. We estimate the total overall CE of the initial proposed limits and other requirements to be about \$6.23 per pound of VOC reduced, and about \$0.22 per metric ton of CO₂ equivalent reduced.

It should be noted that a contributing factor to the total average cost per pound of VOC reduced is that the VOC emission reductions achieved from some of the proposed limits specific to individual categories may be quite low. A limit may have been set largely as a cap, with the few reductions being achieved resulting in a few VOC reductions and a low CE. While the costs incurred by manufacturers to reformulate small categories is not excessive, when those costs are apportioned to a relatively small emission reduction, the CE may appear low (high cost per pound of VOC reduced). Therefore, when presenting the overall CE of the proposal, one should consider the effect of relatively low CE in some categories.

**Table VII-5
Estimated Total Nonrecurring Fixed Costs to Comply with Proposed Limits**

Table VII-5. Estimated Total Annualized Non-Recurring Fixed Cost to Comply with Proposed Standards

Category	Proposed Limit	Market Covered (% covered by 2003 Survey)	Market Adj. Factor	Estimated # Products Non-compliant* (A)	Estimated Total One-Time Cost to Reformulate Per Product (dollars)	Estimated Annualized Cost to Reformulate Product (dollars per year)	Estimated Annualized Fixed Cost to Reformulate All Non-Compliant Products (dollars per year)
Adhesives							
Chemically Curing Sealant or Caulking	3	90	1.11	112	\$10,608	\$34,293	\$5,581
Non-chemically Curing Sealant or Caulking	15	90	1.11	159	\$10,608	\$33,857	\$5,510
		Sum		271			\$467,834
Automotive							
Motor Vehicle Wash	0.2	90	1.11	61	\$10,317	\$10,317	\$1,679
Windshield Water Repellent	75	90	1.11	30	\$10,317	\$10,317	\$1,679
Tire or Wheel Cleaner	8	90	1.11	6	\$10,317	\$10,317	\$1,679
Aerosol	2	90	1.11	43	\$10,317	\$10,317	\$1,679
		Sum		140			\$235,064
Household Care							
Carpet/Upholstery Cleaner	5	90	1.11	58	\$15,693	\$100,699	\$16,388
Aerosol	1	90	1.11	70	\$15,693	\$40,832	\$5,645
Dusting Aid	17	90	1.11	32	\$15,693	\$27,173	\$4,422
Non-aerosol	3	90	1.11	10	\$15,693	\$27,173	\$4,422
Fabric Protectant (non-aerosol)	1	90	1.11	23	\$15,693	\$24,993	\$4,068
Fabric Softener (single use dryer product)	2.5	90	1.11	7	\$15,693	\$20,634	\$3,358
Floor Maintenance Product (Spray Buff)	1	90	1.11	46	\$15,693	\$24,557	\$3,997
Floor Polish or Wax (Wood Floor Wax)	70	90	1.11	6	\$15,693	\$63,936	\$10,405
Glass Cleaner (aerosol)	10	90	1.11	70	\$15,693	\$47,952	\$7,804
Multi-Purpose Lubricant							
Aerosol - Tier 1	25	90	1.11	122	\$15,403	\$164,053	\$26,699
Aerosol - Tier 2	10	90	1.11	144	\$8,864	\$79,338	\$12,912
Non-aerosol - Tier 1	25	90	1.11	19	\$11,043	\$146,907	\$23,908
Non-aerosol - Tier 2	10	90	1.11	20	\$7,556	\$38,652	\$6,290
Odor Remover/Eliminator (non-aerosol)	6	90	1.11	33	\$8,137	\$55,653	\$9,057
Penetrant							
Aerosol	25	90	1.11	50	\$11,770	\$157,805	\$25,682
Non-aerosol	25	90	1.11	12	\$8,719	\$140,659	\$22,892
Presaturated Gas Duster	150**	90	1.11	80	\$15,693	\$38,652	\$6,290
Spot Remover							
Aerosol	15	90	1.11	58	\$15,693	\$101,135	\$16,459
Non-aerosol	3	90	1.11	144	\$15,693	\$40,832	\$6,645
		Sum		1004			\$2,271,420
Personal Care							
Astringent/Toner (Non-FDA regulated)	35	90	1.11	29	\$12,642	\$45,772	\$7,449
Personal Fragrance Product	75	90	1.11	16	\$12,642	\$12,642	\$2,057
Aerosol	75	90	1.11	453	\$12,642	\$26,010	\$4,233
Non-aerosol		Sum		498			\$1,024,567
							\$2,166,516

2007 Chemical Engineering Plant Cost Index =
1991 Chemical Engineering Plant Cost Index =
* Noncompliant Products = Market Adj. x (# Noncompliant Products in Survey)
** GWP limit

525 (Final 12/07)
3613 (Final 1991)

Discount Rate
Project Horizon, yrs
Cost Recovery Factor

10.00%
10
0.16275

Grand Annual Total
(dollars per year)

\$3,998,905

\$16,382,908

Table VII-6 shows a comparison of the CE for the proposed limits relative to other ARB consumer product regulations and control measures. As expected, costs for the proposed amendments are higher than other recent consumer products measures. These higher costs can be attributed to regulating smaller emitting and/or more challenging categories than in the past.

Table VII-6
Comparison of Cost-Effectiveness for ARB Consumer Product Regulations/Measures

Regulation/Control Measure	Cost-Effectiveness (Dollars per Pound VOC Reduced)
2008 Amendments	\$6.23
2006 Amendments ¹	\$2.35
2004 Amendments ¹	\$2.01 to \$2.34
Aerosol Adhesives ²	\$6.00
Architectural and Industrial Maintenance Coatings ³	\$1.12

1 Categories where reduction of toxic air contaminant emissions occurred were included (ARB, 2004b; ARB, 2006a).

2 ARB, 2000c.

3 Suggested Control Measure, developed with the California Air Pollution Control Officers Association (ARB, 2007i).

F. ANALYSIS OF THE IMPACTS TO RAW MATERIALS COST

1. Introduction

As part of the economic impact analysis, we evaluated the expected cost impacts from the proposed limits on raw material costs. As stated previously, the raw material costs generally constitute the major portion of the compliance costs for most categories. However, evaluating the impacts to raw material costs provides only an indicator of possible impacts to the retail prices of the affected products (assuming the cost impacts are passed on partially or fully to consumers). Because of unpredictable factors such as the highly competitive nature of the consumer products market, it is not possible to accurately predict the final retail price of products that will comply with the proposed limits when they become effective. To the extent the cost impacts are passed on to consumers, the final retail prices may be lower or higher than suggested by this analysis.

2. Methodology

As discussed previously, staff determined the formulations which most closely reflect the “typical” compliant and noncompliant VOC contents. These formulations, in turn, were designated as compliant and non-compliant formulations, respectively.

Distributor-level ingredient prices from *ICIS Chemical Business* website (ICIS, 2008), and chemical materials distributors were used to calculate the baseline and compliant material costs for these formulations. Sources of cost information were used for selected ingredients as discussed previously. Other than compounds specifically requested, the 2003 Survey did not ask for specific ingredient details for exempt, fragrance, some low vapor pressure VOCs, and inorganic compounds. Unspecified ingredients or ingredients for which prices were unknown were grouped into an “all others” classification and assigned a default low and high cost of \$3.50 and \$7.00 per pound, respectively (ARB, 1997b), with the exception of fragrance which was assumed to have a default low and high cost of \$5.00 and \$10.00 per pound respectively. However, inorganic compounds tend to be less expensive and using the default low and high cost would not give an accurate representation of inorganic compound cost. Therefore inorganic compounds were assigned a low and high cost of \$0.09 and \$0.91 per pound based on the costs found of the most common inorganic compounds found in the product categories. These analyses and the formulations evaluated (with individual weight fractions and unit prices per pound) are shown as cost spreadsheets in Appendix D. While these formulations may not reflect the exact composition of existing noncompliant products and compliant products that will be marketed, we believe they are reasonably representative for the purposes of this analysis.

3. Assumptions

As noted previously, we assumed changes in packaging, labeling, distribution and other recurring costs to be negligible relative to baseline levels of these costs (ARB, 1997b). The most likely pathway for reformulation was assumed for noncompliant products. Despite this assumption, alternative formulations may allow lower-cost compliant products than shown in our analysis.

4. Results

As shown in Table VII-7, the anticipated raw materials cost changes range from no cost (net savings or no cost) to about \$0.63 increase per unit (for Floor Polish or Wax – Wood Floor Wax).

**Table VII-7
Estimated Impacts to Raw Materials Cost Per Unit**

Table VII-7. Estimated Impacts to Raw Materials Cost Per Unit

Category	Estimated Raw Material Costs, \$/Unit of Product					
	Baseline Pre-Regulatory		Compliant		Cost Difference from Baseline Pre-Reg	
	Low (A0)	High (B0)	Low (A1)	High (B1)	to Low (A1)-(A0)	to High (B1)-(B0)
Adhesives						
Chemically Curing Sealant or Caulking	1.41	3.13	1.44	3.18	0.03	0.05
Non-chemically Curing Sealant or Caulking	0.59	1.47	0.57	1.43	0.00	0.00
Automotive						
Motor Vehicle Wash	1.53	3.02	1.55	3.09	0.02	0.07
Windshield Water Repellant	0.46	0.61	0.38	0.52	0.00	0.00
Tire or Wheel Cleaner						
Aerosol	0.10	0.13	0.10	0.15	0.00	0.02
Non-aerosol	0.09	0.11	0.07	0.08	0.00	0.00
Household Care						
Carpet/Upholstery Cleaner						
Aerosol	0.11	0.14	0.07	0.10	0.00	0.00
Non-aerosol	0.57	0.81	0.48	0.67	0.00	0.00
Dusting Aid						
Aerosol	2.25	4.27	1.45	2.68	0.00	0.00
Non-aerosol	2.63	5.21	2.62	5.12	0.00	0.00
Fabric Protectant (non-aerosol)	2.10	3.79	0.74	1.38	0.00	0.00
Fabric Softener (single use dryer product)	0.43	0.86	0.43	0.86	0.00	0.00
Floor Maintenance Product (Spray Buff)	7.93	14.85	7.47	14.19	0.00	0.00
Floor Polish or Wax (Wood Floor Wax)	1.14	2.02	1.41	2.65	0.27	0.63
Glass Cleaner (aerosol)	0.11	0.15	0.09	0.13	0.00	0.00

**Table VII-7
Estimated Impacts to Raw Materials Cost Per Unit (continued)**

Category	Estimated Raw Material Costs, \$/Unit of Product					
	Baseline Pre-Regulatory		Compliant		Cost Difference from	
	Low (A0)	High (B0)	Low (A1)	High (B1)	to Low (A1)-(A0)	to High (B1)-(B0)
Household Care						
Multi-Purpose Lubricant						
Aerosol - Tier 1	0.29	0.43	0.29	0.42	0.00	0.00
Aerosol - Tier 2	0.29	0.42	0.26	0.36	0.00	0.00
Non-aerosol - Tier 1	3.62	5.10	3.68	4.94	0.00	0.06
Non-aerosol - Tier 2	3.68	4.94	3.72	4.86	0.00	0.04
Odor Remover/Eliminator (non-aerosol)	2.09	3.47	1.56	2.51	0.00	0.00
Penetrant						
Aerosol	0.45	0.66	0.41	0.56	0.00	0.00
Non-aerosol	3.97	5.26	3.96	5.07	0.00	0.00
Pressurized Gas Duster	1.25	2.19	1.12	1.14	0.00	0.00
Spot Remover						
Aerosol	0.32	0.44	0.24	0.33	0.00	0.00
Non-aerosol	0.76	1.21	0.63	0.89	0.00	0.00
Personal Care						
Astringent/Toner (Non-FDA regulated)	0.13	0.16	0.12	0.15	0.00	0.00
Personal Fragrance Product						
Aerosol	0.20	0.39	0.20	0.39	0.00	0.00
Non-aerosol	0.25	0.50	0.24	0.49	0.00	0.00
					Min Increase	0.00
					Max Increase	0.63

Table VII-7. Estimated Impacts to Raw Materials Cost Per Unit (continued)

Table VII-8 shows a comparison of the impacts to raw materials cost under the proposed limits relative to those of other ARB consumer product regulations.

**Table VII-8
Comparison of Raw Materials Cost Impacts for the Proposed Limits and Other
ARB Consumer Product Regulations (unadjusted dollars)**

Regulation	Cost Impacts (Dollars per Unit of Product)
2008 Amendments	\$0.00 to \$0.63
2006 Amendments ¹	\$0.00 to \$0.44
2004 Amendments ²	\$0.00 to \$0.77
Mid-Term Measures II ³	\$0.00 to \$0.25
Aerosol Adhesives ⁴	\$0.00 to \$0.60
Architectural and Industrial Maintenance Coatings ⁵	\$0.00 to \$4.40

1. (ARB, 2006a)

2. (ARB, 2004b)

3. (ARB, 1999)

4. (ARB, 2000c)

5. Suggested Control Measure, developed with the California Air Pollution Control Officers Association (ARB, 2007i)

G. ANALYSIS OF THE COMBINED IMPACTS ON PER-UNIT COST FROM RECURRING AND NONRECURRING COSTS

1. Introduction

In this analysis, we evaluated the combined impacts of both recurring (i.e., raw materials costs) and nonrecurring costs from the proposed limits on per-unit costs. Although the raw material costs generally constitute the major portion of the compliance costs, in some categories, the nonrecurring (fixed) cost was the major contributor. In performing this analysis, we used the fixed costs, raw material costs, assumptions, and other facts discussed previously.

2. Methodology

Nonrecurring Costs

Historically, staff has considered a variety of costs in its calculations to determine the costs of complying with proposed VOC limits affecting consumer products. In the 1991 Phase II Consumer Products Rulemaking, staff developed a methodology to determine nonrecurring reformulation costs (non-raw material costs) for proposed VOC limits. These costs were broken down by each process needed for reformulation to occur (ARB, 1991a). It was subsequently determined through a thorough cost analysis

of the reformulations that was done to comply with the 55 percent by weight VOC limit for hairspray, that these costs were overestimated by a factor of 10. It was widely believed that the 55 percent by weight VOC limit for hairspray represented the most aggressive, challenging, and expensive reformulation that had been required by the Consumer Products Regulations. Therefore, subsequent cost analyses grew the factors by the Chemical Engineering Plant Cost Index then divided these reformulation factors by 10 (see Section C, Equation (4)).

There are many variables in producing a product for market, and assumptions about those variables will greatly affect the outcome of any cost analysis. For each assumption, a test of "reasonableness" was applied to determine if this was a likely approach to take or if the event had a high probability of occurring. Results were also compared to data provided by other agencies and industry to verify that the numbers are "reasonable." Significant input regarding reformulation costs have been provided by industry representatives. In all cases, only new or additional costs were considered. Costs were not considered that would have been expected in the normal course of business if the regulation had not been in effect.

To estimate nonrecurring cost numbers, the staff considered two cost estimate approaches for each product category, one for low cost, and one for high cost, with a different set of assumptions for each approach. To further refine the analyses, the product categories proposed for regulation were grouped under "adhesives," "automotive," "household care," and "personal care" to better reflect the impact on each category.

3. Approach

For a systematic approach to the cost analysis, the entire time from initial statement of development goals to final delivery of the new product to the marketplace shelves was divided into eight phases. The phases are: product development, including reformulation and development of a new delivery system if necessary; stability testing; efficacy testing; safety testing; labeling modification; registration with regulatory agencies, if necessary; manufacturing change; and marketing. The length of time in each phase was estimated based on an industry analysis of 80 new product innovations. Most of the phases occur in sequence; however, there is some time overlap in each phase.

Next, estimated personnel resources were allocated against each phase considering the most probable types of skills needed including general engineering; technician; drafting; packaging engineering; specification engineering; model making; chemical engineering; technical publication; production support; quality assurance; marketing; warehousing; word processing; and clerical. For high cost elements, additional personnel were allocated to each phase.

After the personnel costs were determined, additional cost elements were considered at each phase and added as appropriate. These cost elements are facility; equipment; tool; jig; fixture and miscellaneous materials handling equipment; purchased

material; packaging; distribution; warehousing; technical data; research studies and tests; promotional literature; residual inventory and disposal; consumer tests; general and administrative expense; patent; registration fees; and computer support. The result of these considerations is a per-product cost for developing a reformulated product and putting it on the market.

4. Assumptions

The staff used different assumptions for the low and high cost analyses, and considered the specific likelihood that each of the cost elements would occur for each product category individually. In reviewing the 2003 Survey, staff found that many of the products which would technically be noncomplying are within a couple of percentage points of VOC weight from being in compliance with the standard. These products may require only minor modification to their current formulation to come into compliance. Therefore, for the low cost analysis no major costs were added for changing delivery systems or other product attributes.

In addition, it is common that large companies having significant market-share and broad product lines offer both low VOC complying products and higher VOC noncomplying products. In many cases, relatively low costs would be incurred where these companies could increase sales and distribution of complying products and discontinue noncomplying products.

If products do not change significantly, it is assumed that major retooling of manufacturing equipment would not be required, technical data changes would be minor, and the change in marketing costs would be small. It was also assumed that these reformulated products would be marketed nationally.

For the high cost approach, each category was analyzed individually to determine which of the elements, discussed above, manufacturers would likely include in their reformulation efforts. High costs for specific steps of the reformulation process were only included in the cost analysis where staff believed they were likely to occur. If staff believed a markedly different product would be needed to comply with the proposed limit, such as a new delivery system, then high personnel and capital resources, especially in product development and manufacturing changes, were assumed. In addition, a new delivery system would require investment for prototypes, new filling machines training, and technical data, so these high costs were also included in these scenarios. Additional costs were also added for packaging, distribution and warehousing. In areas where it was expected that little or no reformulation would occur, or that the cost of reformulation would be minimal, the value for low cost was used (Tire or Wheel Cleaner, Motor Vehicle Wash).

For especially challenging limits, it was assumed for the high cost approach that, because of a markedly different product, there would also be additional marketing costs, including research studies and tests, promotional literature, and consumer tests. These costs vary by the type of product, with household products typically having a larger

expense in this area. The cost analysis did not include the costs for an extensive advertising campaign. New products are regularly brought onto the market, and the advertising for a new product, whether reformulated or not, would replace the advertising for the existing product, and would be a normal cost. It was assumed that the new product would be marketed nationally.

The staff also recognized that development of a new product does not occur in isolation. Few companies have only one product line; for those that have more than one product line, the product lines can be very similar. Development and production tasks, from the initial concept through marketing, would be proceeding simultaneously on more than one product line, with a transfer of information and work-sharing between the products. For these companies, this “technology transfer” would substantially reduce the cost of developing and marketing a new product on a per product basis. For categories where the majority of products were held by a few companies it was assumed that this “technology transfer” would occur, and high costs adjusted accordingly.

Therefore, staff has considered only nonrecurring costs that are likely to occur on a per category basis. If it was determined that for a majority of products in the category, the most likely scenario was that only minor changes to the product’s reformulation were necessary to comply with the new proposed limit then only the lower end of the nonrecurring cost was included. For some categories, it was appropriate, based on the variety of products and reformulation approaches needed to meet the proposed limit, that certain high cost factors be included in the analysis, but not others, on a case-by-case basis. We believe that this approach gives a more realistic estimate of the costs of a given limit.

5. Results

As shown in Table VII-9, the combined fixed and raw material cost changes to per-unit production costs ranged from no cost increase (net savings or no cost for various categories) to about \$2.05 per unit (for 1 gallon of non-aerosol Penetrant). Averaged over all of the noncomplying products affected by the proposed limits and other requirements, the product-weighted average cost increase is about \$0.20 per unit.

H. OTHER POSSIBLE ECONOMIC IMPACTS FROM PROPOSED AMENDMENTS

Beyond the VOC and GHG limits, there are other proposed amendments to the Consumer Products Regulation, some of which may have a potential economic impact on affected businesses. While we do not expect any significant economic impact from any of the proposals, it is possible that there could be some increased cost to business resulting from proposed changes.

Some products that do not need to reformulate, because they already comply with the VOC limits, may need to relabel because of other proposed changes to the regulation.

Table VII-9
Estimated Per-Unit Cost Increases from Both Annualized Nonrecurring and Annual Recurring Costs

Category	Sales-Vol'd Average VOC Content, %	Estimated VOC Emissions, ton/day	Typical Unit Weight Ounces	Complying Market Share	Estimated Non- complying Unit Sales Per Day in Calif.	Estimated Per Unit Production Cost Increase						
						Annualized Nonrecurring Low Cost/Unit	Annualized Nonrecurring High Cost/Unit	Annual Recurring Low Cost/Unit	Annual Recurring High Cost/Unit	Total Increase Low/Unit	Total Increase High/Unit	Total Increase Mid/Unit
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)
Adhesives	Chemically Curing Sealant or Caulking	7	1.88	13.5	22.5	49,338	\$0.00	\$0.00	0.03	0.05	\$0.03	\$0.05
	Non-chemically Curing Sealant or Caulking	2	0.67	13.5	76.3	18,820	\$0.00	\$0.02	0.00	0.00	\$0.00	\$0.02
Automotive	Motor Vehicle Wash	1	0.38	64.0	89.0	2,090	\$0.02	\$0.02	0.00	0.00	\$0.02	\$0.02
	Windshield Water Repellent	86	0.23	16.0	50.3	\$0.03	\$0.03	0.00	0.00	\$0.03	\$0.03	\$0.03
	Tire or Wheel Cleaner	8	0.01	12.0	***	53	\$0.06	\$0.06	0.00	0.00	\$0.06	\$0.06
	Aerosol	2	0.13	16.0	69.0	4,030	\$0.01	\$0.01	0.00	0.00	\$0.01	\$0.01
Household Care	Carpet/Polishing Cleaner	7	0.32	18.0	10.0	7,314	\$0.01	\$0.04	0.00	0.00	\$0.01	\$0.04
	Aerosol	3	0.29	138.0	25.0	1,681	\$0.04	\$0.09	0.00	0.00	\$0.04	\$0.09
	Dusting Aid	23	0.27	17.0	5.3	2,093	\$0.01	\$0.02	0.00	0.00	\$0.01	\$0.02
	Aerosol	2	0.01	33.0	74.0	126	\$0.07	\$0.12	0.00	0.00	\$0.07	\$0.12
Non-aerosol	Fabric Protectant (non-aerosol)	5	0.18	138.0	95.0	42	\$0.47	\$0.75	0.00	0.00	\$0.47	\$0.75
	Fabric Softener (single use dryer product)	4	0.52	2.0	24.0	158,080	\$0.00	\$0.00	0.27	0.83	\$0.27	\$0.83
	Floor Maintenance Product (Spray Buff)	5	0.11	132.0	53.4	248	\$0.16	\$0.25	0.00	0.00	\$0.16	\$0.25
	Floor Polish or Wax (Wood Floor Wax)	82	0.06	16.0	***	136	\$0.04	\$0.15	0.00	0.00	\$0.04	\$0.15
Multi-Purpose Lubricant	Glass Cleaner (aerosol)	11	0.33	16.0	37.0	3,780	\$0.02	\$0.05	0.00	0.00	\$0.02	\$0.05
	Aerosol - Tier 1	48	3.19	8.0	2.8	25,839	\$0.00	\$0.04	0.00	0.00	\$0.00	\$0.04
	Aerosol - Tier 2	25	1.84	8.0	1.7	28,940	\$0.02	\$0.02	0.00	0.00	\$0.00	\$0.02
	Non-aerosol - Tier 1	48	1.31	100.0	5.9	747	\$0.02	\$0.20	0.00	0.06	\$0.02	\$0.26
Odor Remover/Eliminator (non-aerosol)	Non-aerosol - Tier 2	25	0.76	100.0	5.9	832	\$0.01	\$0.05	0.00	0.04	\$0.01	\$0.09
	Penetrant	2.2	0.12	130.0	82.2	239	\$0.06	\$0.42	0.00	0.00	\$0.06	\$0.42
	Aerosol	41	0.34	12.0	28.0	1,592	\$0.02	\$0.27	0.00	0.00	\$0.02	\$0.27
	Non-aerosol	25	0.06	100.0	36.0	45	\$0.13	\$0.05	0.00	0.00	\$0.13	\$0.05
Pressurized Gas Duster	Spot Remover	300*	1014**	10.0	86.0	1,967	\$0.03	\$0.09	0.00	0.00	\$0.03	\$0.09
	Aerosol	22	0.76	18.0	4.0	5,896	\$0.01	\$0.05	0.00	0.00	\$0.01	\$0.05
	Non-aerosol	2	0.29	138.0	94.0	202	\$0.61	\$1.59	0.00	0.00	\$0.61	\$1.59
Personal Care	Astringent/Toner (Non-FDA regulated)	21	0.62	8.0	70.0	3,543	\$0.01	\$0.02	0.00	0.00	\$0.01	\$0.02
	Personal Fragrance Product	81	0.16	3.5	35.0	1,174	\$0.01	\$0.01	0.00	0.00	\$0.01	\$0.01
	Aerosol	81	0.16	3.5	35.0	1,174	\$0.01	\$0.01	0.00	0.00	\$0.01	\$0.01
	Non-aerosol	81	10.73	3.5	37.0	76,302	\$0.00	\$0.01	0.00	0.00	\$0.00	\$0.01

* GWP
 ** Metric tons CO₂e per day
 *** Omitted to protect confidentiality.

Table VII-9: Estimated Per-Unit Cost Increases from Both Annualized Non-Recurring and Annual Recurring Costs

We expect that businesses will benefit economically from the exemption of HFE 7200 from the definition of VOC, because it could offer more formulation flexibility.

There may be minimal reformulation costs incurred by those very few companies that use chlorinated solvents in those categories for which staff has proposed to prohibit the toxic compounds.

I. MITIGATION OF POTENTIAL IMPACTS THROUGH ADDITIONAL REGULATORY FLEXIBILITY

If adopted by the Board, the proposed limits will be incorporated in section 94509 of the Consumer Products Regulation (title 17, California Code of Regulations, sections 94507-94517). To complement the mandatory VOC limits specified in section 94509, the existing consumer products program provides a very high degree of compliance flexibility, through two voluntary, market-based programs: the IPP and the ACP Regulation. These options could be evaluated to minimize cost impacts. The IPP (section 94511) allows qualified manufacturers to sell products that have VOC contents greater than the applicable VOC limit, provided they demonstrate that such products actually emit less VOCs than representative products that comply with the VOC limit. Using the emissions averaging approach, the ACP is a voluntary regulation (title 17, CCR, sections 94540-94555) designed to allow multi-product VOC averaging as an alternative means of complying with the VOC limits.

Various manufacturers have formulated technologically-advanced IPP products that are more concentrated, higher in efficacy, or have some other chemical or physical properties that permit users to release less VOCs when using such products. To date, 14 manufacturers have submitted and obtained approval for 25 IPP applications involving 23 products. Based on their participation in the program, it is reasonable to conclude that manufacturers are using this program to provide consumers with products that meet their needs, while lowering costs, improving the “market value” of their products, or otherwise maintaining profit margins.

The potential benefits of emissions averaging or “bubbling” for consumer product manufacturers under the ACP regulation have been documented by ARB staff (ARB, 1994). In general, emissions averaging under approved ACPs allows manufacturers to choose the least-cost or other advantageous reformulation options for its product lines. Rather than directly complying with each and every VOC limit, manufacturers can choose to “overcomply” with some reformulations in order to offset the “undercompliance” of other product lines. The ACP regulation requires the net resulting emissions from products under such averaging plans to be no greater than the level which would have resulted had all the products under the ACP bubble directly complied with the applicable limits. In short, the same emission reductions are achieved while providing a high degree of formulation and marketing flexibility to manufacturers. To date, three manufacturers have implemented approved ACP averaging programs, reducing VOC emissions by about 4.9 million pounds more than would have occurred

under the mandatory VOC limits. We expect that such emissions averaging will also benefit manufacturers subject to the proposed limits.

Overall, most affected businesses will benefit from the IPP and the ACP Regulation. Both programs are completely voluntary and impose no additional costs to businesses to meet their requirements other than testing and reporting requirements. Manufacturers who take advantage of these market-based programs presumably do so because it costs less than direct compliance with the limits or it provides some other market benefits. It should be noted that because the IPP and ACP provisions apply to VOC only, manufacturers of Pressurized Gas Dusters would not have the opportunity to use the provisions to address GWP limits.

According to previous staff analyses, the potential cost differential which might result from competition under the ACP between small and large firms would not necessarily cause extreme hardship on small firms. However, inclusion of the proposed limits in the ACP regulation may increase the level of competition for some products and may lead to the elimination of some marginal producers for those products. Such competition may also have minor impacts on California employment and payroll. However, the impact is expected to be positive in the long term. Any potential impacts on the ability of California businesses to compete with businesses in other states are also expected to be minimal.

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VIII. ENVIRONMENTAL IMPACTS

In this rulemaking, ARB staff is proposing amendments to the Consumer Products Regulation that are designed to reduce volatile organic compounds (VOC) and air toxic emissions. The amendments would also reduce the use of greenhouse gas (GHG) compounds with high global warming potential (GWP) used in consumer products.

We have evaluated the environmental impacts of the proposed amendments on atmospheric processes and other media. Overall, we found that the proposed amendments would have beneficial effects and reduce exposure to ground-level ozone and air toxics. No significant adverse impacts were identified. However, several measures are proposed to mitigate the potential for adverse impacts to occur. In making these determinations, we evaluated how the proposed amendments would impact ground-level ozone concentrations, particulate matter (particularly secondary organic aerosols), climate change, stratospheric ozone depletion, air toxic emission exposure, water quality, solid waste, and energy use.

Staff has conducted a qualitative health risk assessment that concludes that because VOCs are ozone precursors, public health is further protected by reducing VOC emissions. Staff has also determined that ambient air and personal exposures to perchloroethylene (Perc), methylene chloride (MeCl), and trichloroethylene (TCE) will be reduced by prohibiting the use of these chlorinated toxic air contaminants (TAC).

Our analysis of the reasonably foreseeable environmental impacts of the methods of compliance is presented in subsections C through H below. Regarding reasonably foreseeable mitigation measures, the California Environmental Quality Act (CEQA) requires an agency to identify and adopt feasible mitigation measures that would minimize any significant adverse environmental impacts described in the environmental analysis.

A. LEGAL REQUIREMENTS APPLICABLE TO THE ANALYSIS

The CEQA and ARB policy require an analysis to determine the potential adverse environmental impacts of proposed regulations. Because ARB's program involving the adoption of regulations has been certified by the Secretary of Resources (see Public Resources Code section 21080.5), the CEQA environmental analysis requirements are allowed to be included in ARB's Initial Statement of Reasons instead of preparing an environmental impact report or negative declaration. In addition, ARB will respond in writing to all significant environmental points raised by the public during the public review period or at the Board hearing. These responses will be contained in the Final Statement of Reasons for the proposed amendments to the Consumer Products Regulation.

Public Resources Code section 21159 requires that the environmental impact analysis conducted by ARB include the following: (1) an analysis of the reasonably foreseeable environmental impacts of the methods of compliance; (2) an analysis of reasonably foreseeable feasible mitigation measures; and, (3) an analysis of reasonably foreseeable alternative means of compliance with the regulation. Before we present our analysis of the environmental impacts, for ease of the reader the proposed amendments are summarized in Part B.

B. SUMMARY OF PROPOSED AMENDMENTS

1. Proposed VOC Standards

Staff is proposing to establish new or lower VOC limits for multiple categories. These limits would reduce VOC emissions by about 5.8 tons per day when fully effective. The proposed amendments to reduce VOC emissions would partially fulfill the consumer product reduction commitment contained in the 2007 Strategy to meet the federal ozone standard.

2. Proposed Greenhouse Gas Measure

We are proposing an amendment to reduce the use of GHG with high GWP in Pressurized Gas Duster products. Pressurized Gas Duster products would not be allowed to contain a compound that has a GWP of 150 or greater. This proposal would essentially eliminate use of hydrofluorocarbon (HFC) 134a in this category. In 2010, we anticipate that this measure would achieve a reduction equivalent to reducing of 0.20 million metric tons of carbon dioxide (CO₂) per year.

To ensure that the VOC content of these products does not increase as a result of reformulation to meet the GWP limit, a 1 percent by weight, including fragrance, VOC limit is also being proposed for Pressurized Gas Duster products. To mitigate potential exposure to air toxics, we are also proposing to prohibit use of MeCl and Perc in this category.

3. Proposed VOC Exemption

Staff is proposing that the definition of VOC be modified to exclude two isomers of hydrofluoroether (HFE) 7200. In a report titled "Environmental Impact Assessment of Selected Halogenated Chemicals," (ARB, 2008b) ARB staff determined that use of HFE-7200 has negligible impacts on ground-level ozone formation. Staff believes that exemption of this negligibly reactive compound would provide additional reformulation flexibility.

4. Proposed Toxics Prohibition

Staff is also proposing a measure to reduce emissions of three TACs in the categories proposed for VOC regulation where they are, or could potentially, be used. The proposed prohibition on the use of Perc, MeCl, and TCE in six categories would result in a reduction of about 0.20 tons per day when fully effective.

5. Proposed Definitions and Clarifying Language

Staff is also proposing additional language modifications. These modifications include clarifying language for the product date coding requirement, requirements for dilutable products sold in pump spray containers, toxic compound prohibitions, and additional requirements for categories such as Fabric Softener – Single Use Dryer Product, Personal Fragrance Product with 20 percent or less fragrance, and Sealant or Caulking Compound. Other proposals include the correction of a drafting error in the Table of Standards regarding Furniture Maintenance Product. The long-standing exemption for solid/paste wax forms would be reinstated.

C. SUMMARY OF IMPACTS ON ATMOSPHERIC PROCESSES

In this section, we evaluate the impacts on atmospheric processes. The evaluation includes our assessment on whether the proposed amendments would have a positive, negative, or no impact on these atmospheric processes.

1. Impacts of Proposed Amendments on Ground-level Ozone Concentrations

Enhanced ground-level ozone formation involves the interaction between VOCs and oxides of nitrogen (NO_x) in the presence of sunlight. The rate of ozone generation is related closely to both the amount and reactivity of VOC emissions as well as the amount of NO_x emissions available in the atmosphere (Seinfeld and Pandis, 1998). Ozone is a colorless gas and the chief component of urban smog. It is one of the State's more persistent air quality problems. Ninety-three percent of Californians, or 36 million people, live in areas designated as non-attainment for the federal 8-hour ozone standard. It has been well documented that ozone adversely affects respiratory function of humans and animals. Research has shown that, when inhaled, ozone can cause respiratory problems, aggravate asthma, impair the immune system, and cause increased risk of premature death.

Not only does ozone adversely affect human and animal health, but it also affects vegetation throughout most of California resulting in reduced yield and quality in agricultural crops, disfiguration or unsatisfactory growth in ornamental vegetation, and damage to native plants. More information on the impacts of exposure to ozone can be found in Chapter IV, of this Technical Support Document.

a. Proposed VOC Standards

The proposed amendments are designed to reduce VOC emissions by about 5.8 tons per day when fully effective. Reducing these ozone precursor emissions will result in a positive environmental impact by lowering the concentrations of ground-level ozone in the atmosphere. If we assume that the average ozone forming potential of consumer product VOC emissions is about 1.50 pounds of ozone per pound of VOC emitted (based on the maximum incremental reactivity (MIR) scale, see title 17, CCR, sections 94700-94701), then we would predict the resulting ozone reductions would be about 9 tons per day. The categories proposed for regulation and the corresponding VOC emission reductions are shown in Table VIII-1.

b. Proposed Greenhouse Gas Measure

The proposed GHG measure would have no impact on ground-level ozone concentrations. This is because the proposal essentially requires replacing HFC-134a with HFC-152a. Both HFC-134a and HFC-152a are excluded from the definition of VOC due to negligible photochemical reactivity with respect to ozone. However, to ensure VOC emissions do not increase, as a mitigation measure, staff is proposing to set a 1 percent by weight VOC limit to prevent VOC increases as products reformulate.

c. Proposed VOC Exemption

The exemption of HFE-7200 will likely have a positive impact on ground-level ozone concentrations. Whenever this negligibly reactive compound replaces more reactive VOCs the result will be a reduction in ground-level ozone concentrations. Replacing HFE-7200 for similarly unreactive compounds, such as MeCl, Perc, and hydrochlorofluorocarbon (HCFC) 141b, should have no impact on ground-level ozone concentrations.

d. Proposed Toxics Prohibition

In accordance with CEQA, we are proposing a mitigation measure to ensure that emissions of Perc, MeCl, and TCE do not increase when products are reformulated. As such, we are proposing to prohibit the use of these TACs in Carpet/Upholstery Cleaners; Fabric Protectants; Multi-Purpose Lubricants; Penetrants; Sealant or Caulking Compounds; and Spot Removers. The prohibition of these three solvents is necessary, particularly for MeCl and Perc because they are also exempt VOCs. However, this proposal to prohibit the use of Perc, MeCl, and TCE in these six categories could result in a slight increase in VOC emissions. Products containing these TACs may have to reformulate using VOC solvents. Staff, therefore, evaluated the potential for VOC emission increases resulting from this proposal.

Table VIII-1
Proposed VOC Limits, Emissions, and Reductions at Effective Date

Product Category		Product Form	Proposed VOC Limit (percent by weight)	2008 VOC Emissions* (tons per day)	Reductions at Effective Date (tons per day)
Astringent/Toner (non-FDA regulated) ^a		All	35	0.62	0.11
Carpet/Upholstery Cleaner ^a		Aerosol	5	0.32	0.07
		Non-aerosol	1	0.29	0.07
Dusting Aid ^a		Aerosol	17	0.27	0.08
		Non-aerosol	3	0.01	0.00
Fabric Protectant ^a		Non-aerosol	1	0.18	0.08
Fabric Softener – Single Use Dryer Product ^a		All	0.05 grams per use**	0.52	0.21
Floor Maintenance Product ^a		All	1	0.11	0.07
Floor Polish or Wax – Wood Floor Wax ^a		All	70	0.06	0.01
Glass Cleaner ^b		Aerosol	10	0.33	0.03
Motor Vehicle Wash ^a		All	0.2	0.38	0.14
Multi-purpose Lubricant – excluding solid & semisolid ^{c/e}		All	25 ^c	4.08	2.04
			10 ^e		1.27
Odor Remover/Eliminator ^a		Aerosol	25	***	0.00
		Non-aerosol	6	0.12	0.03
Penetrant ^c		All	25	0.40	0.15
Personal Fragrance Product (products with 20% or less fragrance) ^d		All	75 ⁺	10.89	0.41
Pressurized Gas Duster ^a		All	1	0	0
Sealant or Caulking Compound	Chemically Curing ^b	Non-aerosol	3	1.9	0.22
	Non-Chemically Curing ^a	Non-aerosol	1.5	0.68	0.12
Spot Remover ^a		Aerosol	15	0.76	0.24
		Non-aerosol	3	0.29	0.05
Tire or Wheel Cleaner ^a		Aerosol	8	0.01	0.00
		Non-aerosol	2	0.14	0.06
Windshield Water Repellent ^a		All	75	0.23	0.04
Total Emissions 2008		22.61 tons per day			
Total Reductions 2015		5.76 tons per day			

* Survey emissions adjusted for market coverage,
and grown to the 2008 calendar year

** Grams per use limit provides emissions reductions equivalent
to 2.6% VOC limit, including fragrance

*** Omitted to protect confidentiality

+ Remove "Grandfather" clauses

Effective Dates:

a: 12/31/2010

b: 12/31/2012

c: 12/31/2013

d: 12/31/2014

e: 12/31/2015

The emissions of chlorinated solvents in these categories is about 0.20 tons per day. If we assume that these solvents are replaced one-to-one with VOC solvents, then the increase in VOC emissions would be no more than 0.20 tons per day. We expect VOC increases will be less because other reformulation options are available. Note, however, that TCE is a VOC. This is a neutral impact because VOC would replace VOC. Although no aerosol or non-aerosol Fabric Protectant products currently contain any of these chlorinated solvents, this category is included in the proposed prohibition to prevent use in reformulations. The 5.8 tons per day VOC reduction already accounts for the increase of VOC emissions due to the toxics prohibition proposal. Staff believes the potential slight increase in VOC emissions is out-weighed by the benefit of reducing exposure to these probable human carcinogens.

e. Proposed Definitions and Clarifying Language

We expect no impact or a slight benefit on ground-level ozone concentrations resulting from the proposed changes to definitions and language change proposals. Currently, the Consumer Products Regulation states that any product that is designed to be diluted prior to use is subject to the VOC limits after the product has been diluted. Staff has become aware of products packaged in pump spray containers that appear to be marketed as “ready-to-use” products, but are designed to be diluted by the consumer prior to use. Staff believes this approach to packaging may be diminishing VOC reductions, and is a potential circumvention of the intent of the regulation.

Therefore, the proposal to apply the VOC limit for dilutable products sold in pump spray containers, prior to the minimum recommended dilution, could provide a slight benefit. It is likely these products are used undiluted, resulting in higher VOC emissions than allowed by the VOC limit. The other language changes add clarity and do not impact emissions.

2. Impacts of Proposed Amendments on Particulate Matter (Secondary Organic Aerosols)

Fine particulate matter (PM) is prevalent in the urban atmosphere (see, for example, Pandis *et al.*, 1992), and ambient PM, especially those with diameters less than two and a half micrometers (PM_{2.5}), is known to have negative impacts on human health (Schwartz *et al.*, 1996; Moolgavkar and Luebeck, 1996). Like ozone, PM can be formed via atmospheric oxidation of organic compounds (Finlayson-Pitts and Pitts, 2000). Significant advances have been made in the theoretical and the experimental studies of the formation of secondary organic aerosols (SOA) (Pankow, 1994a, Pankow, 1994b; Odum *et al.*, 1996; Seinfeld and Pandis, 1998; Harner and Bidleman, 1998; Kleindienst, *et al.*, 1999; Yu *et al.*, 1999). In addition, modeling techniques to determine the amount of ozone as well as the amount of aerosol formed from a VOC have been established (Bowman *et al.*, 1994), and the concept similar to maximum incremental reactivity is being applied to quantitatively assess the aerosol formation potential of a VOC (i.e. incremental aerosol reactivity) (Griffin *et al.*, 1999).

Based on the results of these studies, we now know that there is a mechanistic linkage between ozone formation and SOA formation of a VOC. Because of this relationship, the proposed amendments may also affect the SOA formation potential of consumer products. The analysis of the impact on SOA formation resulting from implementing the proposed VOC limits is detailed below.

Although most organic compounds contribute to ozone formation, SOA is usually formed from photooxidation of organic compounds with carbon numbers equal to six or more (Seinfeld and Pandis, 1998). It has also been shown that aromatic compounds are more likely to participate in the formation of SOA than are alkanes (Grosjean, 1992; Pandis *et al.*, 1992). In other words, only chemicals that react fast enough in the atmosphere will generate sufficient amounts of low volatility products for forming aerosols. In general terms, the potential to form SOA among commonly used classes of VOCs used in consumer products could be described by the following order, with the lower molecular weight alkanes and ketones being least likely:

Least Likely	Lower molecular weight alkanes and ketones (6 carbons or less)
	Higher molecular weight alkanes
	Higher molecular weight aromatics (polysubstituted benzenes)
More Likely	Lower molecular weight aromatics (C6 - C8 compounds)

a. Proposed VOC Standards

The analysis of the potential impact on PM formation from the proposed VOC limits assumes that to meet the proposed limits will require replacing 5.8 tons per day of VOCs for 5.8 tons per day of non-VOC ingredients or exempt VOCs. To meet the proposed VOC limits, manufacturers generally have five reformulation options: use of exempt VOCs, such as acetone or methyl acetate; use of LVP-VOC solvents; use of water; increasing 'solids' content; or use of non-VOC propellants. Substitution for VOCs with water, higher solids content, or non-VOC propellants would likely result in a small reduction in SOA formation. The most likely exempt VOC solvents to be used to comply, acetone and methyl acetate, both having three carbon atoms, have little potential to contribute to SOA formation. Indeed, it has been predicted that there would be no SOA yield from acetone (Pandis *et al.*, 1992). Hence, use of these compounds could also result in a reduction in SOA.

To the extent manufacturers may reduce overall VOC content but formulate with stronger solvents could result in increased SOA formation. This is because the commonly used stronger solvents are aromatic compounds, such as xylenes and toluene, which are known to have higher SOA potentials than other commonly used VOCs. On the other hand, if product reformulation involves the substitution of an aromatic by a non-aromatic species, the SOA formation potential of the product is likely to be reduced. If VOC aromatics are replaced with LVP-VOC aromatic compounds, a decrease in SOA potential should also occur. However, substitution of LVP-VOC

alkane or aromatic compounds for smaller low molecular weight alkanes could result in a slight SOA increase (Grosjean, 1992).

Because we can not predict how manufacturers will choose to reformulate, we can not fully evaluate the potential for increased SOA formation. However, it is likely to be only a slight potential for increase, if any, due to the variety of reformulation options available. At any rate, it will not be a significant adverse impact. Additionally, any reformulations that result in increased SOA would likely be offset by reformulations resulting in lower SOA. We will continue to monitor implementation of the regulation and reassess the impacts as more data become available.

b. Proposed Greenhouse Gas Measure

Because this proposal essentially requires the replacement of one compound for another – each with two carbon atoms – we expect the proposal to have no impact on PM_{2.5} concentrations or SOA.

c. Proposed VOC Exemption

As mentioned above, SOA is generally formed from oxidation of compounds with six or more carbon atoms. We do not expect HFE-7200 to increase SOA concentrations because HFE-7200 is comprised of two isomers, each with four carbon atoms.

d. Proposed Toxics Prohibition

The proposal to prohibit TACs in six categories should have no or negligible impacts on SOA formation because replacements for these TACs (alkanes or exempt compounds) are not known to have strong SOA formation potentials. Prohibiting use of Perc and MeCl in Pressurized Gas Duster products also should have no impact.

e. Proposed Definitions and Clarifying Language

Because proposed language changes and definitions generally only clarify or provide descriptions, we expect no impact on PM_{2.5} or SOA.

3. Impacts of Proposed Amendments on Climate Change

Climate change, or global warming is the process whereby emissions of anthropogenic pollutants, together with other naturally-occurring gases, absorb infrared radiation in the atmosphere, leading to increases in the overall average global temperature. While CO₂ is the largest contributor to radiative forcing, methane, halocarbon, N₂O, and other species also contribute to climate change.

Gases in the atmosphere can contribute to the greenhouse effect both directly and indirectly. Direct effects occur when the gas itself is a GHG. While there is relative

agreement on how to account for these direct effects of GHG emissions, accounting for indirect effects is more problematic. Indirect radiative forcing occurs when chemical transformations of the original gas produce other GHGs, when a gas influences the atmospheric lifetimes of CH₄, and/or when a gas affects atmospheric processes that alter the radiative balance of the earth (e.g., affect cloud formation).

As mentioned earlier, the GWP of a compound may reflect a direct effect as well as an indirect effect on global warming. The direct effect is the warming due to the absorption of radiation by molecules of the compound in question. VOCs, CO₂, HFCs, HFEs, and HCFCs all have direct effects. The indirect effect is due to the impact that the presence of the compound has on the concentration of other GHGs. For example, VOCs contribute indirectly to global warming, in-so-far as they react chemically in the atmosphere in ways that increase GHG concentrations, most notably, concentrations of ozone and methane. The indirect forcing of VOCs is, however, still poorly quantified and requires the use of global three-dimensional chemical transport models.

Even though VOCs have direct effects, they are considered as GHGs because of their role in creating ozone and in prolonging the life of methane in the atmosphere, although the effect varies depending on local air quality. A further narrative on climate change and expected impacts is included in Chapter IV of this Technical Support Document.

a. Proposed VOC Standards

As just described, VOCs are considered GHGs because of their role in creation of ozone. However, because the VOC limits will reduce the total amount of VOCs, and thereby ground-level ozone concentrations, the proposed VOC limits should reduce consumer product's impacts on climate change. While we expect an overall positive impact, two reformulation options may lead to very slight increases in GHG emissions. These are discussed below.

To meet the proposed VOC limits to a limited extent, CO₂ may replace hydrocarbon propellants in some products. The 2003 Survey data indicate that CO₂ is already used in certain consumer products considered for regulation, including Multi-Purpose Lubricants, and Penetrants. In these categories, CO₂ use is likely to increase as manufacturers reformulate to meet the lower proposed VOC limits. In other categories with aerosol product forms, CO₂ may also be a reformulation pathway. Even though CO₂ has a direct effect on climate change, co-benefits are expected to the extent that CO₂ replaces VOC propellants in consumer products. Specifically, less ozone and methane will be formed, thus lowering the population's exposure to a pollutant with serious health effects. Further, the contribution of CO₂ to global warming is likely less than that of the VOC being replaced. In addition, most CO₂ used as a propellant is a recycled by-product of existing processes and, therefore, does not increase global warming from a lifecycle standpoint (ARB, 1999).

Another reformulation path for some aerosol product manufacturers may be to replace some or all the typical hydrocarbon propellants with HFC-152a or HFC-134a. These compounds are exempt VOCs. We do not predict increased usage of HFC-134a due to its higher GWP, and because its use is not recommended except in certain specific uses. In consumer products, HFC-134a is generally used when flammability is a concern.

Staff believes that for the Spot Remover category under consideration for regulation, HFC-152a may be a potential reformulation option. If all VOC propellants in these categories were replaced with HFC-152a, total emissions of HFC-152a would be 0.17 tons per day. This represents a worst-case scenario. Staff believes usage would be considerably less because of raw material cost and because other reformulation options are available.

Also, when cost considerations are factored in (HFC-152a is about \$1.80 per pound, HFC-134a is \$3.50 versus VOC propellants at \$1.00 per pound), it is anticipated that manufacturers will use as little HFC-152a as possible, or none at all, when reformulating their aerosol products. ARB staff does not expect the price of HFCs to change appreciably in the near future, thus a significant increase in use is not anticipated.

Based on the foregoing, while there is a slight potential for a very small increase in the emissions of HFC-152a, the proposed VOC limits will likely more than offset this impact by reducing concentrations of ground-level ozone.

b. Proposed Greenhouse Gas Measure

The proposal to reduce the use of compounds with high GWP in Pressurized Gas Dusters will have an overall beneficial impact on climate change. As proposed, the GWP limit for Pressurized Gas Dusters would require products using HFC-134a to reformulate with HFC-152a. This reformulation would be equivalent to reducing 0.20 MMT CO₂ per year, effective December 31, 2010.

c. Proposed VOC Exemption

HFE-7200 is a solvent proposed for exemption from the VOC definition based on its photochemical reactivity. It has a relatively low GWP of 59 based on the FAR values. Its main use is in precision cleaning, and its use will likely be limited to applications where HCFC-141b is, or has been, used. Because it is a stratospheric ozone depleting compound, HCFC-141b production is no longer allowed. However, use of existing stockpiles is allowed. In addition to depleting stratospheric ozone concentrations, HCFC-141b is also a fairly potent global warming compound with a FAR GWP value of 725. HFE-7200 is purported as an all or partial replacement for HCFC-141b in that it provides mild cleaning ability and reduces flammability. In the short-term, to the extent HFE-7200 is used to replace HCFC-141b, a reduction in the potency of GHG emissions is expected. This is a direct emission benefit related to

climate change. To the extent HFE-7200 replaces VOCs in various consumer product categories, there will be a small increase in direct GHG emissions. This will likely be offset by the indirect benefit of reduced ground-level ozone concentrations.

A longer term potential benefit may also be expected. Precision cleaning products where flammability is a concern generally rely on use of the propellant HFC-134a, a potent global warming gas. Because of the ability to reduce flammability, as well as its solubility with CO₂, in the future, it is possible that use of HFE-7200 in combination with CO₂ as a propellant, could lead to further limiting the use of HFC-134a (Werner, 2008).

d. Proposed Toxics Prohibition

The prohibition on the use of Perc, MeCl, and TCE will likely have a negligible to positive impact on GHG emissions. If VOCs are used to replace these TACs, because VOCs play a role in both direct and indirect impacts on global warming, this would lead to a very slight increase in global warming emissions. We believe the reduced exposure to these TACs out-weighs this potential increase.

e. Proposed Definitions and Clarifying Language

Clarifying language and proposed definition changes should have no impact on global warming.

4. Impacts of Proposed Amendments on Stratospheric Ozone Depletion

The stratospheric ozone layer shields the earth from harmful ultraviolet (UV) radiation. Depletion of the earth's ozone layer allows a higher penetration of UV radiation to the earth's surface. This increase in UV radiation penetration leads to a greater incidence of skin cancer, cataracts, and impaired immune systems. Reduced crop yields and diminished ocean productivity are also expected. Because the chemical reactions which form ground-level ozone are driven by UV radiation, it is conceivable that a reduction in stratospheric ozone may also result in an increase in the formation of photochemical smog because of the increased levels of UV radiation on the earth's surface (ARB, 2000b). The chemicals most implicated as causing stratospheric ozone depletion are chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and halons (U.S. EPA, 2003). Specifically, the chlorine or bromine atoms released by photolysis of the compounds react in chain reactions leading to the catalytic destruction of ozone (Finlayson-Pitts and Pitts, 2000).

Solar irradiation in the stratosphere contains sufficient UV light to break down CFCs and HCFCs to yield chlorine atoms that convert ozone to molecular oxygen. However, this UV light is not strong enough to break down HFCs and HFEs to create fluorine atoms. In addition, the molecular structure of HFCs and HFEs includes hydrogen atoms, which renders them susceptible to attack by hydroxyl radicals in the

troposphere. Therefore, these chemicals have a relatively short atmospheric lifetime which does not allow any appreciable amounts to penetrate into the stratosphere (ARB, 2008b).

To address stratospheric ozone depletion, the Montreal protocol was enacted in 1989, to phase out a number of CFCs, HCFCs, and halons. As a signatory of this protocol, the United States, in the Federal Clean Air Act of 1990 established timetables for ceasing production (see part 40, Code of Federal Regulations, section 602). In general, the protocol establishes dates by which certain compounds can no longer be manufactured; however, existing stocks can continue to be used in some applications until exhausted.

a. Proposed VOC Standards

Reducing VOCs will have no impact on stratospheric ozone depletion. As products reformulate to meet the proposed VOC limits, provisions in the Consumer Products Regulation (see section 94509(e)) already prohibit the use of various stratospheric ozone depleting compounds. This provision ensures there will be no increased use of stratospheric ozone depleting compounds.

b. Proposed Greenhouse Gas Measure

The proposed GHG measure will have no impact on stratospheric ozone depletion. Neither HFC-134a nor HFC-152a contribute to stratospheric ozone depletion. This is mainly because these compounds do not contain chlorine. Therefore, substituting HFC-152a for HFC-134a in Pressurized Gas Dusters has no impact. Additionally, these compounds have relatively short atmospheric lifetimes. Both compounds contain hydrogen which makes them susceptible to hydroxyl radical attack in the troposphere.

c. Proposed VOC Exemption

Use of HFE-7200 would be a positive impact if it replaces HCFC-141b, a known stratospheric ozone depleting compound. HFE-7200 itself is not an ozone depleting compound because it does not contain chlorine. In addition, because the compound contains hydrogen it may be susceptible to hydroxyl radical attack in the troposphere.

d. Proposed Toxics Prohibition

The proposed prohibition on the use of Perc, MeCl, and TCE will likely have a negligible impact on stratospheric ozone depletion. In order to comply with this prohibition, VOCs may replace these TACs in reformulated products. If this occurs, VOCs are not stratospheric ozone depleting compounds. Additionally, manufacturers are precluded from reformulating with stratospheric ozone depleting compounds because provisions in the regulation already prohibit use of various stratospheric ozone depleting compounds (94509(e)).

e. Proposed Definitions and Clarifying Language

Clarifying language and proposed definition changes will have no impact on stratospheric ozone depletion.

D. OTHER POTENTIAL ENVIRONMENTAL IMPACTS

1. Impacts of Proposed Amendments on Solid Waste Disposal

Consumer products contribute to the solid waste stream by virtue of the containers and the towelettes or “wipes” used to deliver the product. Therefore, we evaluated the potential impacts of the proposed amendments on the solid waste stream.

a. Proposed VOC Standards

We do not expect an adverse impact on solid waste disposal from the proposed amendments relating to VOC limits. This is because we do not anticipate any changes in packaging or disposal due to the amendments. We also designed the VOC limit for Fabric Softener – Single Use Dryer Product so that the waste stream will not be adversely impacted by increasing sheet size to comply. To mitigate the potential for solid waste impacts from this category, staff is proposing a VOC standard based on grams of VOC per use (typically a single dryer sheet per load), as opposed to a percent by weight VOC limit.

It has been suggested that end-use consumers of Fabric Softeners – Single Use Dryer Products may begin using more than a single dryer sheet per load of laundry. The contention is that the reformulated dryer sheet products will be perceived to be inadequate, because of the reductions in fragrance. No data were provided to support this claim. Moreover, this suggestion implies that the consumer will essentially begin doubling the cost per load of clothes dried. This is highly unlikely. Absent data, staff has determined this potential increased use to be unfounded. It has also been suggested that the end-use consumers will switch use to liquid products which are packaged in bulkier plastic containers. Again, no data were provided to support this claim. However, we intend to monitor product sales trends through periodic surveys, as is always done, to ensure that unintended consequences of establishing the proposed VOC limit do not occur.

b. Proposed Greenhouse Gas Measure

We expect that the GHG proposal could result in reducing the solid waste stream. This is because data show that Pressurized Gas Duster products that use HFC-152a typically get more uses per can than products that use HFC-134a (Dupont & Falcon, 2004). We also note that no significant changes in packaging will be needed to reformulate with HFC-152a.

c. Proposed VOC Exemption

The proposed VOC exemption should have no solid waste impacts because we expect HFE-7200 to replace VOCs on a one-to-one basis. No new or additional packaging should be needed.

d. Proposed Toxics Prohibition

The proposed TAC prohibition should have no impact because the compounds used to replace Perc, MeCl, and TCE (VOCs or exempt compounds) require no different packaging, or additional packaging.

e. Proposed Definitions and Clarifying Language

By specifying that VOC content be determined prior to the minimum dilution, for products intended for dilution, but sold in ready-to-use pump sprays should reduce the amount of solid waste. If products are used as is, without making the dilution, the number of uses per container would be greatly reduced, compared to if the product were properly diluted. The overall result, without this provision, would be that more containers would be landfilled.

2. Impacts of Proposed Amendments on Water Quality

Because of how consumer products are used there are potential water quality impacts. Therefore, we evaluated the impacts of the proposed amendments on water quality.

a. Proposed VOC Standards

Reducing VOCs should have no impact on water quality and could ultimately result in a positive impact. As products reformulate to meet the proposed VOC limits, to a limited extent, water may replace VOCs in some products. This would have a positive impact on water quality by reducing the quantity of VOCs that might be introduced to the water supply. If exempt compounds replace VOCs in reformulated products, there should be no impact. This is because as far as water chemistry is concerned, VOCs and VOC exempt compounds are similar compounds. It is also true that many VOCs are biodegraded as they pass through the waste water stream.

b. Proposed Greenhouse Gas Measure

The proposal to reduce the use of compounds with high GWP in Pressurized Gas Duster products will have no impact on water quality. Both HFC-134a and HFC-152a have an air fate and are not likely to enter the water.

c. Proposed VOC Exemption

Use of HFE-7200 is expected to have no impact or a slightly beneficial impact on water quality. HFE-7200 is volatile, and based on its intended use, emissions have an air fate. However, there may be a slight benefit to sanitation districts resulting from the potential decrease in the amount of chlorinated solvents reaching water treatment facilities if HFE-7200 is used in place of Perc, MeCl, or TCE in products (ARB, 2008b).

d. Proposed Toxics Prohibition

Current use of Perc, MeCl, and TCE in Carpet/Upholstery Cleaner; Fabric Protectant; Multi-Purpose Lubricant; Penetrant; Sealant or Caulking Compound; and Spot Remover is not expected to have an impact on water quality. This is because as used, these solvents have an air fate. However, the proposed prohibition of Perc, MeCl, and TCE from these six categories may prevent an increase in the amount of chlorinated solvents reaching storm drains, and waste water treatment plants if these products are misused or improperly discarded. As a result of this proposal, TAC emissions will be reduced by about 0.20 tons per day in 2010.

e. Proposed Definitions and Clarifying Language

Because the proposed language changes and definitions generally only clarify or provide descriptions, we expect no impacts on water quality.

3. Impacts of Proposed Amendments on Energy

We do not expect the proposed amendments to result in an increase in energy use because production and shipment of the reformulated products will be similar to existing products.

It has been suggested that end-use consumers of Fabric Softeners – Single Use Dryer Products may shift use to liquid products. The contention is that the reformulated dryer sheet products will be perceived to be inadequate, related to potential reductions in fragrance. If this were to occur, fuel usage could increase as products are transported, due to the weight differential between Fabric Softeners – Single Use Dryer Products and liquid products. No data were provided to support this claim. Absent data, we believe the concern with this potential switch is unfounded. Moreover, other data show that consumers favor the use of Fabric Softeners – Single Use Dryer Products (SDA, 2006a). However, we intend to monitor product sales trends through periodic surveys, as is always done, to ensure that unintended consequences of establishing the proposed VOC limit do not occur.

E. ANALYSIS OF REASONABLY FORESEEABLE MITIGATION MEASURES

As part of our obligations under CEQA, the ARB staff is required to evaluate and mitigate potential adverse environmental impacts resulting from regulatory proposals. Also, pursuant to Health and Safety Code section 39650 *et seq.*, the ARB is required to identify and control TACs. The Health and Safety Code defines a TAC as "...an air pollutant which may cause or contribute to an increase in mortality or serious illness, or which may pose a hazard to human health." Moreover, in accordance with section 39666 of the Health and Safety Code, for TACs for which no safe exposure threshold has been established, the ARB is required to "... reduce emissions to the lowest level achievable through application of best available control technology or a more effective control method...."

Several chemicals currently used in the consumer product formulations considered for regulation have been identified as TACs. An increased or continued use of TACs in any of the consumer product categories considered for regulation could lead to a potential adverse environmental impact. ARB staff has evaluated this potential and has concluded that there would be a potential adverse environmental impact of implementing the VOC limits. Therefore, staff is proposing mitigation measures designed to ensure that use of TACs will be reduced or prohibited, resulting in a positive environmental impact.

We also found that the GHG measure could result in increased VOC emissions as products are reformulated to comply with the GWP limit. A mitigation measure is proposed to address this potential.

In evaluating proposed VOC reduction opportunities for Fabric Softener – Single Use Dryer Product we considered, as is typically done, a percent by weight VOC limit. However, we determined using this approach could result in simply increasing the sheet size to comply. Therefore, the gram of VOC per use limit is designed as a mitigation measure to address this potential impact on the solid waste stream.

1. Proposed Mitigation Measure Related to Establishing VOC Limits

Staff believes that specific mitigation measures are necessary to restrict the use of three chlorinated solvents, Perc, MeCl, and TCE because of their potential to cause cancer. Two of these TACs used in some consumer products, MeCl, and Perc, are specifically exempted from the VOC definition (section 94508 of the Regulation) in recognition of their very low ozone-forming capability. Thus, the potential exists that to meet VOC limits, manufacturers could reformulate using these exempt VOC TACs leading to an adverse impact. Trichloroethylene is regulated as a VOC, such that its use should not increase as products reformulate to meet VOC limits. However, because it is a probable human carcinogen, we are proposing a specific mitigation measure to address its use. Below, we provide some general information on toxicity, and the usage of Perc, MeCl, and TCE. Further information on these chemicals is

included in “The Proposed Amendments to the California Consumer Products Regulation and the Aerosol Coatings Regulation,” released September 29, 2006.

Presented in Table VIII-2 are pollutant-specific health effects values developed for Perc, MeCl, and TCE to characterize the relationship between a person's exposure to these TACs and the incidence or occurrence of an adverse health effect. Unit risk factors (URF), cancer potency factors, and reference exposure levels (RELs) are shown in Table VIII-2. Also included in Table VIII-2 are the non-cancer acute and chronic toxicological endpoints for Perc, MeCl, and TCE.

Table VIII-2
Pollutant-Specific Health Effects Values Used for Determining
Potential Health Impacts¹

Compound	Cancer Unit Risk Factor ($\mu\text{g}/\text{m}^3)^{-1}$	Cancer Potency Factor ($\text{mg}/\text{kg}\cdot\text{day})^{-1}$	Non-cancer Reference Exposure Levels ($\mu\text{g}/\text{m}^3$)		Toxicological Endpoints	
			Acute	Chronic	Acute	Chronic
Perchloroethylene (Perc)	5.9 E-6	2.1 E-02	20,000	35	central nervous system; eye & respiratory irritation	kidney; alimentary system (liver)
Methylene Chloride (MeCl)	1.0 E-6	3.5 E-03	14,000	400	central nervous system	cardiovascular system; nervous system;
Trichloroethylene (TCE)	2.0 E-6	7.0 E-03	None	600	none	nervous system; eyes

¹ Health effects values and toxicological endpoints were obtained from the following three sources: (OEHHA, 2005a; OEHHA, 2005b; OEHHA, 2000)

A URF is defined as the estimated upper-confidence limit (usually 95 percent) probability of a person contracting cancer as a result of constant exposure to a concentration of $1\mu\text{g}/\text{m}^3$ over a 70-year lifetime. In other words, using the URF for Perc as an example, which is 5.9×10^{-6} (microgram per cubic meter) $^{-1}$ or $(\mu\text{g}/\text{m}^3)^{-1}$, the potential excess cancer risk for a person continuously exposed over a 70-year lifetime to $1\mu\text{g}/\text{m}^3$ of Perc is estimated to be no greater than 5.9 chances per 1 million exposed people (ARB, 2000c).

A cancer potency factor is the toxicity criterion, or health guidance value used for carcinogens, to describe the potential risk of developing cancer per unit of average daily dose over a 70-year lifetime. Cancer potency values are expressed as the upper bound probability of developing cancer assuming continuous lifetime exposure to a substance at a dose of one milligram per kilogram of body weight, and are expressed in units of $(\text{mg}/\text{kg}\cdot\text{day})^{-1}$. The derivation of inhalation cancer potency factors takes into account

the available information on pharmacokinetics and on the mechanism of carcinogenic action. These values are generally the 95 percent upper confidence limits on the dose-response slope. It is a more accurate measure of a person's chance of developing cancer than is the URF because it considers breathing rate and weight of the individual.

A REL is used as an indicator of potential non-cancer adverse health effects and is defined as a concentration level at or below which no adverse health effects are anticipated. RELs are designed to protect the most sensitive individuals in the population by including safety factors in their development and can be created for both acute and chronic exposures. An acute exposure is defined as one or a series of short-term exposures generally lasting less than 24 hours. Consistent with risk guidelines, a 1-hour exposure is used to determine acute non-cancer impacts. Chronic exposure is defined as long-term exposure usually lasting from one year to a lifetime. Generally, hazard indices of less than 1.0 are not considered to be a concern to public health. A hazard index is the ratio of the modeled concentration for a toxic pollutant and the reference exposure level for that pollutant (ARB, 2000d). A further discussion of the health effects that may result from exposure to Perc, MeCl, and TCE follows.

a. Perchloroethylene

i. Health Impacts from Exposure to Perchloroethylene

Exposure to Perc may result in both cancer and non-cancer health effects. The probable route of human exposure to Perc is inhalation (ARB, 1997a). Table VIII-2 presents the current health effects values that are used for determining the potential health impacts.

Perc is a potential human carcinogen with no identifiable threshold below which no carcinogenic effects are likely to occur. The Board formally identified Perc as a TAC in October 1991 (ARB, 1991b). The State of California under Proposition 65 listed Perc as a carcinogen in April 1988 (OEHHA, 2006).

Short-term (acute) and long-term (chronic) exposure to Perc may result in non-cancer health effects. Acute toxic health effects resulting from short term exposure to high levels of Perc may include headaches, dizziness, rapid heartbeat, and irritation or burns on the skin, eyes, or respiratory tract. Massive acute doses can induce central nervous system depression resulting in respiratory failure. Chronic exposure to lower Perc concentration levels may result in dizziness, impaired judgement and perception, and damage to the liver and kidneys (ARB, 2000d).

ii. Sources and Emissions of Perchloroethylene

Perc is currently used in Carpet/Upholstery Cleaner; Multi-Purpose Lubricant; Penetrant; Sealant or Caulking Compound; and Spot Remover product. Perc is not currently used in any Fabric Protectant products. If Perc is not prohibited from use in these categories, it could conceivably be used as an avenue for compliance with the

proposed lower VOC limits, increasing human exposure. Emissions of Perc in these categories are expected to grow to 0.19 tons per day by 2010.

b. Methylene Chloride

i. Health Impacts from Exposure to Methylene Chloride

Exposure to MeCl (also known as dichloromethane) may result in both cancer and non-cancer health effects. The probable route of human exposure to MeCl is inhalation (ARB, 1997). Table VIII-2 presents the current health effects values that are used to determine potential health impacts.

MeCl is either a possible or probable human carcinogen with no identifiable threshold below which no carcinogenic effects are likely to occur. The Board formally identified MeCl as a TAC in July 1989 (ARB, 1989b). The State of California under Proposition 65 listed MeCl as a carcinogen in April 1988 (OEHHA, 2006).

Short-term (acute) and long-term (chronic) exposure to MeCl may result in non-cancer health effects. MeCl vapor is irritating to the eyes, respiratory tract, and skin. It is also a central nervous system depressant including decreased visual and auditory functions and may cause headache, nausea, and vomiting. Acute toxic health effects resulting from short term exposure to high levels of MeCl may include pulmonary edema, cardiac arrhythmias, and loss of consciousness. Chronic exposure can lead to bone marrow, hepatic, and renal toxicity. MeCl is metabolized by the liver with resultant carboxyhemoglobin formation (ARB, 1997a).

ii. Sources and Emissions of Methylene Chloride

MeCl is currently used in Multi-Purpose Lubricant; and Penetrant products. MeCl is not currently used in Carpet/Upholstery Cleaner; Fabric Protectant; or Sealant or Caulking Compound products. If its use is not prohibited in these categories, MeCl could conceivably be used as an avenue for compliance with the proposed lower VOC limit, increasing human exposure. Emissions of MeCl are expected to grow to 0.01 tons per day by 2010.

c. Trichloroethylene

i. Health Impacts from Exposure to Trichloroethylene

Exposure to TCE may result in both cancer and non-cancer health effects. The probable routes of human exposure to TCE are inhalation and ingestion (ARB, 1997a). Table VIII-2 presents the current health effects values that are used to determine potential health impacts.

TCE is a probable human carcinogen with no identifiable threshold below which no carcinogenic effects are likely to occur. The Board formally identified TCE as a TAC

in October 1990 (ARB, 1990d). The State of California under Proposition 65 listed TCE as a carcinogen in April, 1988 (OEHHA, 2006).

Short-term (acute) and long-term (chronic) exposure to TCE may result in non-cancer health effects. TCE is a central nervous system depressant. It is mildly irritating to the eyes and respiratory tract. Occupational exposure to TCE has resulted in nausea, headache, loss of appetite, weakness, dizziness, ataxia, and tremors. Acute exposures to high concentrations have caused irreversible cardiac arrhythmias, nerve and liver damage and death. Chronic exposure to TCE has also been shown to cause respiratory irritation, renal toxicity, and immune system depression. Alcohol consumption in humans increases the toxicity of TCE and causes "degreaser's flush," which are red blotches on the skin (ARB, 1997a).

ii. Sources and Emissions of Trichloroethylene

TCE is currently used in Carpet/Upholstery Cleaner; Multi-Purpose Lubricant; Penetrant; and Spot Remover. TCE is not currently used in Fabric Protectant products and Sealant or Caulking Compound products. TCE is regulated as a VOC, such that its use should not increase as products reformulate to meet VOC limits. However, because TCE is a probable human carcinogen, we are proposing to prohibit its use in these categories. In 2010, this proposal will reduce emissions of TCE by 0.02 tons per day.

d. Proposed Toxics Prohibition

In this rulemaking, staff is proposing to prohibit the use of Perc, MeCl, and TCE in Carpet/Upholstery Cleaner; Fabric Protectant; Multi-purpose Lubricant; Penetrant; Sealant or Caulking Compound; and Spot Remover products. This proposal is based on data suggesting that there would be potential excess cancer cases resulting from their use. In proposing this prohibition we are relying on previous work conducted by ARB staff.

Specifically we are relying on two previous rulemakings. To review the complete analyses relied upon to propose these prohibitions, the reader is referred to the following two documents:

1. Initial Statement of Reasons for the Proposed Airborne Toxic Control Measure for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities. March 10, 2000. (ARB, 2000d).
2. Initial Statement of Reasons for the Proposed Amendments to the California Aerosol Coating Products, Antiperspirants and Deodorants, and Consumer Products Regulations, Test Method 310, and Airborne Toxic Control Measure for Para-Dichlorobenzene Solid Air Fresheners and Toilet/Urinal Care Products. May 7, 2004. (ARB, 2004b).

In the above listed rulemakings, staff found that use of these chlorinated compounds posed an unnecessary health hazard. As detailed in the March 10, 2000, report, modeling results showed the potential for increased cases of cancer. Because many alternative products were available, the ARB, in 2000, prohibited the use of Perc, MeCl, and TCE in General Purpose Degreasers designed for automotive use, Engine Degreasers, Brake Cleaners, and Carburetor or Fuel-injection Air Intake Cleaners. The 2004 report provided the rationale for prohibiting the use of these three chlorinated solvents in Adhesive Removers, Contact Adhesives, Electrical Cleaners, Electronic Cleaners, Footwear or Leather Care Product, Graffiti Removers, and General Purpose Degreasers. In total, not including this rulemaking, ARB has prohibited the use of Perc, MeCl, and TCE in 62 categories.

Staff has determined that the proposed prohibition is necessary to mitigate potential adverse impacts that would result from implementing VOC limits for these categories, and to ensure a level playing field among all products.

The proposed prohibition of chlorinated solvents in Carpet/Upholstery Cleaner; Fabric Protectant; Multi-Purpose Lubricant; Penetrant; Sealant or Caulking Compound; and Spot Remover is being proposed as a mitigation measure under CEQA (Public Resources Code section 2100 *et seq.*). An alternative basis for the prohibition, however, is the authority granted the ARB to control toxic air contaminants (TACs) under Health and Safety Code section 39665 *et seq.* This section E, comprises the "needs assessment" report for the prohibition on chlorinated solvents, as specified in Health and Safety Code section 39665.

Additional information to support the proposed prohibition on use of Perc, MeCl, and TCE in Carpet/Upholstery Cleaner; Fabric Protectant; Multi-Purpose Lubricant; Penetrant; Sealant or Caulking Compound; and Spot Remover are contained in other documents and within other chapters of this Technical Support Document. Information regarding sources of these TACs (sources of emissions other than what is discussed in this Chapter) and atmospheric persistence has already been presented in the Initial Statement of Reasons for the Proposed Airborne Toxic Control Measure for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities, March 10, 2000, (ARB, 2000d). The reader is referred to this document for further information.

In each category, staff has determined that alternative compounds are available to successfully formulate or reformulate products. More detailed information on alternative products and chemicals that can be used as replacements to Perc, MeCl, and TCE is contained in sections contained in Chapter VI that are specific to these product categories. Costs for reformulating and cost effectiveness of the proposal are contained in Chapter VII of this report.

In the federal Clean Air Act Amendments of 1990, the United States Environmental Protection Agency (U.S. EPA) identified Perc, MeCl, and TCE as

hazardous air pollutants (HAPs) because evidence indicated the substances may have adverse effects on human health or the environment. As of the writing of this report, the U.S. EPA has not promulgated a comparable NESHAP control measure specifically for consumer products containing Perc, MeCl, or TCE. The U.S. EPA has adopted NESHAP standards which control emissions of these HAPs from other sources. These other measures are described in the ATCM for AMR facilities (ARB, 2000d).

To summarize, staff finds that the proposed prohibition on use of Perc, MeCl, and TCE in Carpet/Upholstery Cleaner; Fabric Protectant; Multi-Purpose Lubricant; Penetrant; Sealant or Caulking Compound; and Spot Remover products is necessary to reduce exposure and the health risk associated with use of these compounds. Without control, emissions of Perc, MeCl, and TCE from these six categories would be just over 0.20 tons per day in 2010. Staff has identified that there is a potential for increased chances of contracting cancer from using products containing these compounds. The proposed prohibitions are necessary to mitigate potential adverse impacts that would result from implementing VOC limits for these categories. The prohibitions would also align with State law that requires use of best available control technology in instances where no safe exposure threshold is known.

2. Proposed Mitigation Measures Related to Greenhouse Gas Emissions

Staff is proposing, in new subsection 94509(r)(1), that Pressurized Gas Duster products shall not contain a compound that has a GWP of 150 or greater.

In accordance with CEQA, to ensure that the VOC content of these products does not increase as a result of reformulation to meet GWP limits, a 1 percent by weight, including fragrance, VOC limit is also being proposed for Pressurized Gas Dusters. Also to ensure VOC exempt TAC solvents are not used, staff is proposing to prohibit use of Perc and MeCl in Pressurized Gas Duster products.

3. Proposed Mitigation Measure Related to Fabric Softeners – Single Use Dryer Product

Staff is proposing a new subsection 94509(s) to describe the VOC content limit for Fabric Softener – Single Use Dryer Product. Rather than a percent by weight limit, a 0.05 gram of VOC per use limit is proposed. The limit is designed to ensure that the size of each dryer sheet does not increase. In developing the limit for these products, staff determined that establishing a percent by weight limit could result in product reformulation using larger sheets to comply. This would diminish emissions reductions and potentially lead to increasing the solid waste stream. Therefore, in accordance with CEQA, the gram of VOC per use limit is proposed.

F. RISK ASSESSMENT FOR REDUCED EXPOSURE TO OZONE AND TACS

The health risks associated with ozone exposure have been known for many years and are discussed in detail in Chapter IV. Studies have shown that when inhaled, even at relatively low levels, ozone can impact lung tissue and lung function. The greatest risk is to those who are more active outdoors during smoggy periods, such as children, athletes, and outdoor workers. Exposure to levels of ozone above the current ambient air standard leads to lung inflammation and lung tissue damage, and a reduction in the amount of air inhaled into the lungs. Recent evidence has, for the first time, linked the onset of asthma to exposure to elevated ozone levels in exercising children (McConnell *et al.*, 2002).

The actual lowering of health risks that would result from reducing VOC emissions, if the staff's proposal were to be adopted, is not quantified in this report. However, qualitatively, we are able to conclude that reducing VOC emissions, because of their role as ozone precursors, will result in incremental improvement of the public's health – whether it be in fewer incidences of asthma or hospitalizations, improvement in lung function, or fewer premature deaths.

The VOC reductions from the proposed amendments are designed as partial fulfillment of the State Strategy for California's 2007 State Implementation Plan. Thus, one can conclude that increments of progress towards attainment improve the public's health. As shown in Table VIII-1, the proposed amendments to the Regulation are designed to achieve the maximum feasible VOC emission reduction from the categories proposed for regulation at this time. When fully effective, adopting the amendments would result in a VOC emissions reduction of about 5.8 tons per day. The impacts of our proposal on SOA formation are not clear, although we do not expect a disbenefit.

We are better able to assess the reduced health risk associated with prohibiting the use of the chlorinated solvents Perc, MeCl, and TCE in Carpet/Upholstery Cleaner; Fabric Protectant; Multi-Purpose Lubricant; Penetrant; Sealant or Caulking Compound; and Spot Remover products. Overall, the proposed amendments would prevent chlorinated solvent emissions by about 0.20 tons per day annually in 2010. It should also be noted that the scenarios analyzed to determine increased cancer risk evaluated concentrations in the outdoor air. It is likely that, in indoor environments, workers' and other end-users' chances of increased cancers would be higher from use of products containing these chlorinated solvents.

In summary, our health risk analysis shows that, by achieving these VOC reductions, the proposed amendments would reduce health risks posed by ground-level ozone by slightly lowering ambient concentrations. We predict that almost nine less tons per day of ozone would be formed. Moreover, exposure to probable carcinogens would be reduced by prohibiting the use of chlorinated TACs.

G. ALTERNATIVE MEANS OF COMPLIANCE

Two alternative means of compliance with the Regulation have been developed. A current compliance alternative for manufacturers of consumer products is the Alternative Control Plan (ACP). The ACP Regulation, title 17, California Code of Regulations, sections 94540-94555, is a voluntary emissions averaging program. Under the ACP, an overall limit on the VOC content of emissions from each individual product in the ACP is determined. To be approved, an ACP must demonstrate that the total VOC emissions within the ACP would not exceed the emissions that would have resulted had the products been formulated to meet the VOC limit established for each product category. In other words, some products in the ACP could exceed the established VOC limits in the Regulation as long as those increased emissions were offset by additional products that over-comply with the established VOC limits. The ACP provides manufacturers with flexibility, but preserves the overall environmental benefits of emission reductions.

Another compliance alternative that is available for manufacturers is the Innovative Products Provision specified in title 17, California Code of Regulations, section 94511. This provision allows a manufacturer to formulate products that exceed the mass-based limit specified in the Regulation for a particular product category. The manufacturer must demonstrate that, through some characteristic of the higher VOC product, its use will result in less VOC emissions compared to a representative complying product. This alternative is also specifically designed to allow manufacturers flexibility, while preserving the emission benefits of the Regulation.

Absent use of either of these alternatives, staff is not aware of any additional compliance means, other than direct compliance with the proposed amendments.

H. ENVIRONMENTAL JUSTICE

State law defines environmental justice as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies. The ARB is committed to evaluating community impacts of proposed regulations, including environmental justice concerns.

Consumer products are considered area sources and, as such their use is not focused in a particular area leading to a potential “hot spot.” Generally, use of consumer products is fairly uniform across the State, tracking with housing units, and their emissions are spread over the course of a day, rather than concentrated at a particular time of day. For these reasons, we do not believe that people of any given race, culture, or income would be more impacted than any others would. All Californians should benefit equally from the reduction in VOC emissions from the consumer product categories proposed for regulation, as well as from the prohibition on use of chlorinated solvents that are TACs, and the reduction in potency of GHGs.

Some manufacturers of Astringent/Toner products assert that regulation of these products would adversely affect individuals who cannot afford professional dermatological care. They also contend that higher VOC-containing products may be necessary for people of certain ethnicities to prevent scarring and/or increased pigmentation. ARB staff disagrees with these assertions. We have evaluated the claims and directions on the labels of Astringent/Toner products and researched sales prices of products *via* in-store shelf surveys and on the Internet. We found that complying products that make all Astringent/Toner functional claims are readily available over-the-counter in a variety of retail outlets. Purchase of these products does not require a medical prescription, and these products are not priced differently. Moreover, we have not found or been presented with any data that support these claims. Therefore, we do not believe that the regulation of Astringent/Toner would adversely or disproportionately impact people of any given age, race, culture, or income.

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IX. FUTURE AND ONGOING ACTIVITIES

In this Chapter, we describe future and ongoing activities related to the consumer products program. These activities are directed at developing proposals to further reduce VOC, air toxic and greenhouse gas emissions from consumer products. As always, our rulemaking activities will be conducted in an open, public process, allowing for stakeholder input. Major activities are summarized below.

A. CONSUMER PRODUCT EMISSIONS REDUCTION COMMITMENTS IN THE 2007 STATE IMPLEMENTATION PLAN (SIP)

In the recently adopted SIP, the State Strategy for California's 2007 State Implementation Plan, ARB committed to achieving a further 30 to 40 tons per day VOC emission reduction from consumer products. Measures are to be adopted in the 2007 to 2008 timeframe, with emission reductions achieved by 2010. Additional measures to achieve the overall reduction commitment are to be adopted between 2010 and 2012 with implementation within the 2012 to 2014 timeframe. The VOC reductions proposed in this rulemaking are a first step toward meeting these commitments. As described below in section C, the 2006 Consumer Products Survey data will serve as the basis for identifying and evaluating additional categories for emission reduction opportunities. If feasible, additional proposals would be brought before the Board for consideration in late 2008 or early 2009.

B. GREENHOUSE GAS REDUCTIONS FROM CONSUMER PRODUCTS

As specified in The California Global Warming Solutions Act of 2006 (AB 32), Discrete Early Action Measures are to be adopted and implemented by 2010. Greenhouse gas reductions from consumer products has been designated as a Discrete Early Action Measure. The overall estimate is that greenhouse gas emissions from consumer products could be reduced by 0.25 MMT CO₂e per year. The Pressurized Gas Duster proposal, included in this rulemaking achieves approximately 0.20 MMT CO₂e per year. We expect data collected from the 2006 Consumer Products Survey to provide information on other categories where greenhouse gas reductions are technologically feasible and cost-effective to implement. Additional reduction strategies will be proposed for Board consideration in late 2008 or early 2009.

C. REVIEW AND COMPILATION OF THE 2006 CONSUMER PRODUCTS SURVEY

Staff is continuing review of data from the 2006 Consumer Products Survey. This survey was designed to collect 2006 calendar year product sales and formulation data for a variety of consumer products including aerosol coatings, personal care products, cleaning products, lubricants, pesticides, and others. Some categories were specifically surveyed to evaluate the use of greenhouse gases. This includes hobby,

sporting and party products. Over 500 surveys have been received. We expect to release non-confidential data summaries in summer 2008. These data will serve as the basis for additional VOC and greenhouse gas reduction proposals.

D. PAINT AND LACQUER THINNER WORKPLAN

Data collected in the 2003 Consumer and Commercial Products Survey (2003 Survey) showed Paint and Lacquer Thinner VOC emissions of about 14 tons per day, if grown to 2010 using population estimates. Based on available research, and regulations in place in the South Coast Air Quality Management District (AQMD), in 2007 ARB staff proposed a 3 percent by weight VOC limit for Paint and Lacquer Thinner products. These products and their emissions are not part of the consumer product emission inventory, even though they do meet the definition of “consumer product.” Thus, reductions achieved are not creditable toward the consumer product emission reduction commitment, but are creditable toward the State’s overall SIP commitments.

In response to this proposal, some stakeholders identified a number of technical feasibility issues related to this proposal. Other stakeholders continue to assert that the 3 percent limit is feasible for all applications. ARB staff’s assessment, at present time, is that a 3 percent VOC limit may be feasible for a wide variety of applications, but there are remaining end-uses of Paint and Lacquer Thinner where a higher VOC content may be necessary. To address the issues raised, ARB is developing a document which outlines all stakeholder issues and comments. This document will be reviewed by stakeholders and a workgroup meeting to discuss and resolve concerns would be scheduled for summer 2008. The goal of this process is to set the lowest VOC limit that is commercially and technologically feasible, but ensure that Paint and Lacquer Thinners remain available if there are coatings where thinning may still be necessary. If all issues are resolved, we will propose a VOC control strategy as part of the next rulemaking.

E. NAIL COATINGS WORKPLAN

Staff has been evaluating the feasibility of VOC emission reductions from various nail coating products. Our evaluation, to date, indicates that a reactivity-based control strategy may provide the better regulatory strategy to achieve ozone reductions from this category. However, this work has been postponed until such time as the newly revised maximum incremental reactivity scale has been peer-reviewed. As part of this process, stakeholders have raised concerns regarding the use of the toxic compounds xylenes, toluene, dibutyl phthalate, and formaldehyde. We are actively evaluating these concerns to determine if use of these compounds in nail coatings poses a health hazard in the outdoor ambient air. We are developing modeling scenarios to model emissions of these toxic compounds from an individual business, as well as, cumulative emissions from multiple facilities. The goal of these analyses is to assess the potential risk posed to people living in close proximity to these emission sources. Should a health hazard in outdoor ambient air be identified, ARB would evaluate mitigation strategies under our authority to reduce air toxic emissions. The goal of this work is to achieve the maximum

feasible reduction from these products and, if necessary, mitigate toxic air pollutant exposures. We expect to propose a regulatory strategy for nail coatings as part of the next rulemaking.

F. INNOVATIVE EMISSION REDUCTION STRATEGIES

The 2007 SIP acknowledges that further emission reductions from consumer products may not be feasible using conventional approaches. Staff intends to work with stakeholders to explore alternative market-based mechanisms to encourage the development, distribution, and purchase of cleaner, very low, or zero-emitting products.

We also intend to evaluate other approaches if these market-based mechanisms cannot produce meaningful emission reductions. These approaches include the purchase of ROG (VOC) credits, funding special projects to reduce emissions, or accelerate reductions from pollution sources outside the consumer products source category. Emission reductions achieved through these mechanisms would be creditable toward the overall consumer product reduction commitment.